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Developing a New Customer Value Proposition (CVP) Design Approach for Minerals Processing Plants Project Business

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During my professional career spanning for the last fourteen years, I have picked up a few things about business from numerous people and experiences. However, it took the grind of Industrial Management Master's Program in last one year to understand why and how things are done and should be done in the context of modern business management theories and practices. This thesis has enabled me to apply these learnings to address a real business challenge in my employer company, the case firm in the thesis. Therefore, I am thankful to my company for allowing me to use the business settings as the best laboratory available and for tolerating my naïve mistakes throughout the project.

The erudite instructors and my fellow classmates have been the sources of inspiration throughout the program and big thanks to all of you for the learnings and the experience. I am thankful to Dr. Thomas Rohweder, my thesis instructor for challenging and guiding me, and also for keeping my feet grounded. I am thankful to Sonja Holappa, my writing instructor, for making sure that the thesis content is logical, relevant and understandable. Zinaida Grabovskaia, Head of the Program, has been instrumental throughout the entire program to ensure the efficiency and high quality, in addition to marvellous insights and help. Thank you, Zinaida. I am thankful to Dr. Juha Haimala, Head of the Department, for the communications with my employer to help in the formalities.

This thesis is authored by me but the substance has been co-created by more than twenty dearest colleagues. A big thank you to Gustav, Kari, Toni, Tero, Sakari, Evelina, Markku, Perttu and others. I am thankful to Jari Moilanen for guiding me internally and making sure that I stay on track. Special thanks to my manager, Mikko Rantamäki, for supporting me incessantly and providing the creative space I needed. Above all, I am grateful to all the customers who helped with their invaluable insights.

Finally, I owe this thesis to my dearest and most loving wife, Sohini, who supported and believed in me at every moment, even when I was unsure myself. At the end, this thesis is dedicated to my late mother, who always wanted me to pursue my master's studies. This is for you Ma and I know that you know.

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Various global market drivers are enforcing changes in the B2B mining and metals industry to focus on value-in-use. The case firm, a premier technology and projects company, serves the mining and metals industry through various offerings. The objective of this thesis is to create a new customer value proposition (CVP) design approach for the minerals processing plants project business of the case firm to meet the service driven changes in the industry. One customer segment of the case firm, Junior & Start-up, was chosen as the study premise.

The thesis followed the applied research approach as the focus was to put theory into practice, using the qualitative research method along with few mathematical tools. The research design consisted of five steps. The literature research guided the creation of the conceptual framework, which was applied in analysing the existing CVP of the case firm, developing and validating the new CVP. The current state analysis revealed key weaknesses, such as isolated CAPEX and Services sales; lacking customer focus, for instance, in solution design.

The new CVP design included customer need profiling, creating a value map, checking of problem-solution fit, creating customer specific resonating focus and alternate revenue logics to deliver the CVP. The new CVP was validated internally and externally through customer cases and feedback was used to improve it. The thesis outcomes include a new CVP structure to find customer specific CVP for the target segment, a customer value calculator to deliver the focus CVP through alternate revenue models, and an overall new approach for CVP design. Finally recommendations for future actions are also included in the thesis.

Keywords	Minerals processing, customer value proposition (CVP), revenue logic (RL), value-in-use, service logic, resonating focus, value calculator

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Acronyms

B2B	Business to Business
B2C	Business to Consumer
CAPEX	Capital Expenditure
CF	Cash Flow
CPS	Concentrator Plant Solutions
CRM	Customer Relationship Management
CSA	Current State Analysis
CVP	Customer Value Proposition
DCF	Discounted Cash Flow
EP	Engineering-Procurement
EPC	Engineering-Procurement-Construction
EPCM	Engineering-Procurement-Construction Management
EPS	Engineering-Procurement-Supervision
ICT	Information and Communication Technology
IoT	Internet of Things
LCC	Life Cycle Cost
MP	Minerals Processing
MVP	Minimum Viable Product
NPV	Net Present Value
OPEX	Operating Expenditure
O&M	Operation and Maintenance
POS	Point of Sale
R&D	Research and Development
RL	Revenue Logic
ROIC	Return on Invested Capital
WACC	Weighted Average Cost of Capital

1 Introduction

This thesis explores innovation in Customer Value Proposition (CVP) for the case firm's offerings of minerals processing plant projects for the mining industry. The concept of value is well researched and debated for long in management science, as researchers have tried to define "value" from different perspectives. However, simply put, value is the worth of any goods, services as experienced by both the customers and the providers and measured in different metrics e.g. economic, emotional etc. The value is also generated and acknowledged differently by various stakeholders throughout the entire value chain. The success of a provider is dependent on the extent of its customer value proposition (CVP), meeting or exceeding customer's explicit and implicit needs. Also in the present hypercompetitive service-dominant business environment and 'age of customers', where rapid disruptions and continued uncertainties are the 'new normal', a game changing CVP innovation has the potential to push the value creation envelope beyond industry standards.

The technology and projects companies operating in the Business-to-Business (B2B) environment are commonly classified as part of the Engineering and Construction sector in the industry. These companies serve various customers in the manufacturing and commodity sectors. Very often in bigger projects, the technology and projects companies serve each other as well. Various scope and delivery models exist for the technology and project firms e.g. parts delivery (equipment/product), sub-project deliveries, complete subsystem deliveries (island model), engineering and project management services (EPCM), and turnkey deliveries (integrated solution). There may be additional service components, which are delivered along with main scope or at different points of time, either preceding or following the main scope, such as financing, consulting, supervision and training, spare parts, operation and maintenance advisory and so forth.

Select few companies in the Engineering and Construction sector have all the required services in their portfolio i.e. they provide technology and design engineering services, manufacture own proprietary products, deliver projects with or without construction, and provide after sales services. This group of companies are typically known as the technology leaders in the industry. Major companies in this industry sector are decades old, if not centuries, and have product centricity embedded in their DNA. The business focus is on selling equipment, products and projects as Capital Expenditure (CAPEX) deals. The services of engineering and technology provision are also often integrated with the equipment and/or project offerings.

In recent past, especially in the past decade, many of the technology and projects companies have tried to become more service oriented and increase customer centricity. Of course, these actions have helped to increase share of services sales component to the total revenues. The companies have also realized that the services components usually provide better profit margins, compared to the products or projects, even though the contribution to the companies' top lines can be lower than the CAPEX contributions. But this improvement has been mainly due to an increase in pro-active sales of post-CAPEX deal services by bundling the products and services into "solutions" offerings, not because service has been at the core of customer value propositions (CVP). Consequently, the business models still revolve around product centric approach.

This study focuses on developing an alternative CVP design approach with service centricity at the core for the case company, a leader in technology and projects segment in the Engineering and Construction industry sector. The study uses applied research methodology to develop the solution.

1.1 Case Company Background

The case company is a Finnish multinational company and listed in NASDAQ Helsinki stock ex-change since 2006 with GICS industry classification as Engineering and Construction. Even though the company is just over ten years old as per stock exchange listing, but in practice, the company's human capital carries the legacy of 150 years of pioneering expertise in Finland's mining industrial history. The company's business is based on selling knowledge and profit is derived through engineering, technology, equipment, automation and services provided for exploitation and refinement of natural resources, especially for the mining and metals industries. The operating model of the company is presented in Figure 1 below (Data ID: 1D-d1 from Table 3 in Section 2).

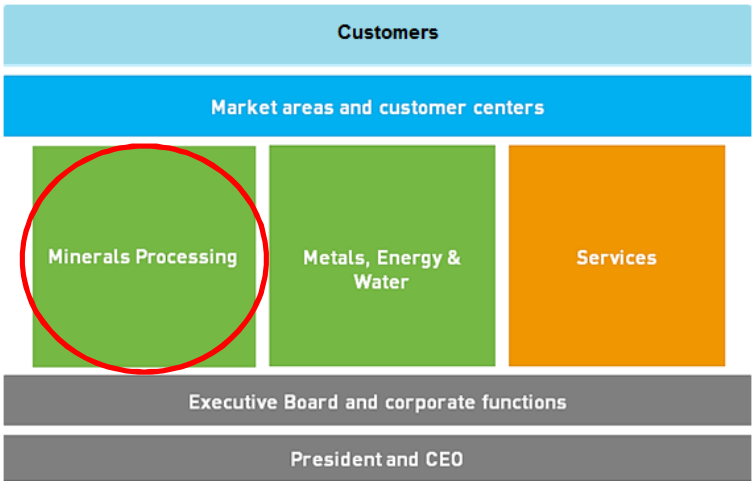

Figure 1. Operating Model of Case Firm.

As shown in above Figure 1, the business is divided into three business units namely Minerals Processing (MP); Metals, Energy and Water (MEW), and Services. The network of market area offices and customer centers in thirty-four countries and six continents ensure integrated operations. The corporate functions build uniform business platforms and provide related services for business operations. The company has 4200 employees as the human capital strength. For this study, only the Minerals Processing (MP) business unit is of interest, circled in Red in the above figure.

Presently the company offers various services for the entire project life cycle. The company provides expert services in the form of consultations, research and testwork activities, feasibility studies and so forth in the pre-sales and the early project phases. In addition to core technological solutions, the firm also provides basic and detailed engineering services, project management and procurement services, commissioning and start-up services, plant audits and trainings. The company also provides various services to the installed base such as spare parts, equipment and plant upgrades, remote and site based technical support and advisory services. The scope of a project for the case company can vary from equipment delivery to entire process plant solutions. The sales process and delivery process have long lead times. Typically, a mining or metallurgical project takes years to be conceptualized, decided on, developed and constructed. Therefore, there are several phases of customer involvement over a long timeline.

The company has focused heavily on services during the last few years, including acquisitions of several contextual service firms. In recent years, the company has also been putting focus on making the organization more customer centric. The customer centricity and service business are part of the company's must-win strategic areas and part of the strategy document (Data ID: 1D-d3 from Table 3 in Section 2).

1.2 Key Concepts

The keywords frequently used as core elements of this thesis include the following:

Concentrator Plant Solutions (CPS): Case firm's offering, which combines engineering, equipment, services to provide a holistic solution in minerals processing plant projects for the mining industry sector. Minerals processing plants are known as concentrators.

Service Logic: The perspective, where all goods and services are considered as different forms of service to facilitate value creation and co-creation

Value-Potential: Expected value by customers or promised value by providers during the exchange process at the Point-of-Sale (POS)

Value-in-Use: The real value created by customers, either independently or collaboratively with the provider, during the use of the products and services

Customer Value Proposition (CVP): The value capture depiction by the provider to the customer in the offerings.

Revenue Logic (RL): The revenue formula associated with CVP, defining how the company earns revenue to create value for itself, while delivering value to the customer.

1.3 Business Challenge, Objective and Expected Outcome

Minerals Processing (MP) is one of the three business units of the case company. In this segment, the company serves the mining industry globally by providing solutions for mineral processing plants in the form of technology, engineering, equipment supply, construction, supervision and after sales service support (spares, advisory, plant audits, operation and maintenance etc.). In following Figure 2, the simplified and short structure of the MP business unit is presented (Data ID: 1D-d2 from Table 3 in Section 2).

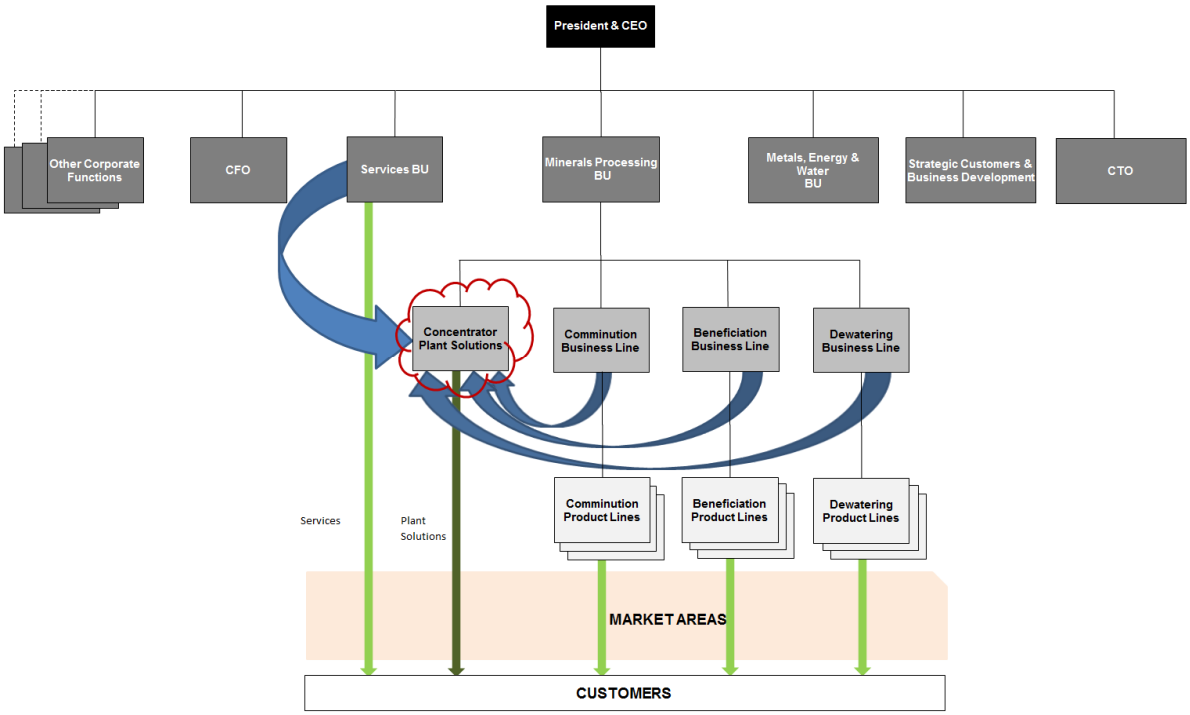

Figure 2. Positioning of CPS in MP BU.

As presented in Figure 2, the MP business unit is divided into three business lines namely comminution, beneficiation and dewatering and one additional unit called concentrator plant solutions (CPS). The three business lines are further sub-divided into various product lines. The key offering of the concentrator plant solutions (CPS) is the minerals processing plant projects in mining industry, combining various products from the three business lines and services from the Services Business Unit. The researcher of this study currently works for the CPS group of the MP business unit, leading a global process technology team.

The mining industry has been changing due to various issues during the last few years. The first and foremost issue is the continuation of depressed metal prices due to sluggish and uncertain GDP growths of the global economies. This trend has created pressure on the feasibility and investment risks in new mining projects globally, thus reducing the number of new projects. This in turn has created cost pressure on few available projects and has led to hyper-competitive market for the case firm.

The second issue is the megatrend of global connectivity and knowledge access due to disruptive technologies in information and communication technology (ICT) sector, including social media platforms. This has resulted in heightened connectivity and knowledge sharing amongst customers and reach to global suppliers. Social media and consumer ICT has made the people to expect rapid development in the mining, industry where development has been more conservative. There are high expectations from Artificial Intelligence (AI) for improving the productivity, but real cases are still rare. Also the customers are no longer ready to pay premium in the capital projects to the technology leaders at the point of sale (POS) for any value promise, because the customer can only realize value from the project when the project is completed i.e. when the plant is in production phase, generating business value for customers. Thus the increase of knowledge-reach and connectivity, along with resistance to pay premium for value-potential, have further intensified competition and subsequently caused price erosion for the case firm.

The third issue influencing the mining industry at present is sustainability demands in various aspects and it has far-reaching consequences in shaping the industry for future. The first aspect is the depletion of easy mining reserves to exploit, which were considered as untouchables in the past. The technology requirement to process these resources are usually complex and therefore expensive, thus further necessitating consistent higher operational efficiencies to extract value for customers. The second aspect is the scarcity of utilities and resources i.e. water, energy, land and skilled people, thus

requiring innovative solutions to optimize the requirement of them. The third aspect is ever increasing tougher norms and regulations from environmental agencies and governments, requiring sustainable and greener solutions in the mining industry, which on the contrary is “polluting” by definition. These aspects together, not only need innovative solution in the CAPEX-project phase but also need continuous support during the production phase (existing or future), thus creating new opportunity for the case firm.

The above three issues therefore represent a connected matrix of challenges and opportunities for the case company, requiring a shift in Customer Value Proposition (CVP). To meet the requirement, the case company needs to re-orient its traditional product centric logic towards a more service-oriented logic. This goal is in line with the recent changes in the corporate strategy of the case firm (Data ID: 1D-d3, d4 and d5 from Table 3 in Section 2). Fundamentally, the case company, with a long history, wide competence and extensive product portfolio is as such well equipped to meet this challenge. However, the firm needs a new approach in its solution offering to operatively address the above business challenge.

What is also important to note in this context is the difference of purchasing behavior in different customer segments of MP business unit. The segmentation can be based on customer size, geography, produced commodities, customer profitability or other such criteria. Traditionally, the mining companies have been classified as the majors (the well-established mining companies with large operations resulting in very high revenues), mid-tiers (established mining companies with medium scale of operations and moderate revenues), juniors (mining companies with low scale operations and comparatively lower revenues) and start-ups (new mining and exploration companies or established company in other industry but new entrant to mining, who have no existing mining operations). The purchase of concentrator plants as projects and also the required goods and services to operate and maintain the same is treated differently in each segment for various underlying reasons. Henceforth, even though the service oriented innovation in the case firm’s CVP is relevant for all the customer segments, the form and approach need to be unique to meet the need of each segment. For the thesis, junior & start-up segment has been chosen as the study premise, because this segment has a greater need for support due to lack of experience.

Thus the objective of this study is:

> *to develop a new customer value proposition for one of the customer segments (“junior & start-up”) of the case company’s minerals processing plants project business to meet the service driven change in the market.*

The expected outcome of the study is a new customer value proposition (CVP) including basic revenue logic for the target customer segment, with comparison to the existing revenue logic and validation from actual customer cases. In addition to the new CVP, a value calculator to demonstrate customer value is a planned outcome. Also the new CVP design approach itself is a key derivative of the study, which can be utilized in innovating CVPs for other customer segments of the case firm.

1.4 Scope and Structure of Study

The scope of the thesis is limited to the creation of a new alternate CVP for the minerals processing plant projects for one of the customer segments and does not include other customer segments or offerings or business areas of the case company. The scope of the study does not include the impact of CVP innovation on other business model components and is limited only to CVP and Revenue Logic (RL).

The thesis is written in seven sections. In the first section (present section), the business challenge, objective of the study and expected outcome from the study are explained in the relevant business context. The second section illustrates the research design approach for the study and describes the methodology and tools for data collection and analysis. The third section presents the current state analysis in the context of the business challenge, covering the case company and its competitors. In the fourth section, the findings from the literature research in the context of the business challenge are presented to formulate the conceptual framework. The fifth section builds the initial proposal, based on the current state analysis findings and the conceptual framework. The sixth section focuses on validating the initial proposal, collecting feedback and concluding with the final proposal. The seventh section summarizes the study and details recommendations for the future. In addition, this section evaluates the relevance and rigour of the study.

2 Method and Material

This section describes the methodology adopted and materials used in the research work of this thesis. First, the selection of research approach and method for the study are explained in the setting of business and management research. Then the research design plan is presented with commentary on each stage. Subsequently, the data collection and analysis methods, and tools are detailed.

2.1 Research Approach

Generally, research is classified as either basic, i.e. research that concentrates on developing theories and general understanding without any aim for practical use or applied, i.e. research that concentrates on practical use and developing solution for a real-life challenge/opportunity (Tushman and O'Reilly III 2007). The emerging and ever changing field of management study is connected in a two-way relationship with professional practice and has a multidisciplinary focus, which draws resources from various other academic disciplines and then combines them to create theories of business and management (Quinton and Smallbone 2006). Unlike research in basic sciences, the research in business management often concentrates on improving communities of practice.

Several research approaches are utilized in business management, e.g. action research, case study, applied research, grounded theory etc. As this study addresses an opportunity area in practical business context for a real case organization and it is driven by the researcher's own interest and involvement, henceforth action research is considered as one possible approach. Applied research, which also has a similar objective to action research i.e. to improve target community with a business solution for a practical business challenge/opportunity, is an alternate approach as well. Therefore, the research strategy for the study need to be selected between these two, relying on the comparison based on the requirement and constraints in this study.

Conceptually action research requires an interactive and reciprocal process to combine theory and practice, thus calling for several iteration rounds of the research steps to obtain the final solution. Action research also needs intensive collaboration with the target community to establish "*theory to practice and practice to theory*". Applied research on the other hand, separates theory and action as two different processes. Applied research focuses on taking the theory forward to practice in a one-way relationship. Even though this approach also requires a high degree of collaboration with the target community, but the goal is to apply the theory on the target community to attain real results. (Lim and Chai 2015)

The need to find suitable theoretical framework for application and then implementing the same through collaboration are two priorities in the study, which involves addressing new potential for the case firm's existing offerings by reinventing. These fit into the four key elements of the applied management research i.e. novelty, grounding basic research, immediate practical relevance and collaborative implementation (Grün 1987). In addition, the other independent variable of time-schedule available for the research is not enough for conducting several iterations of the research steps. Thus, looking into the two factors, applied research is chosen as the research strategy for this project. However, some elements of action research, such as the detailed action planning for one iteration round, are utilized in the research.

The three methods common in business and management research are quantitative, qualitative and mixed methods. One noticeable difference between these methods and a pure conceptual study is the use of empirical data to contribute to the theory (Myers 2013). In Figure 3 below, a simple empirical research model in business and management is presented.

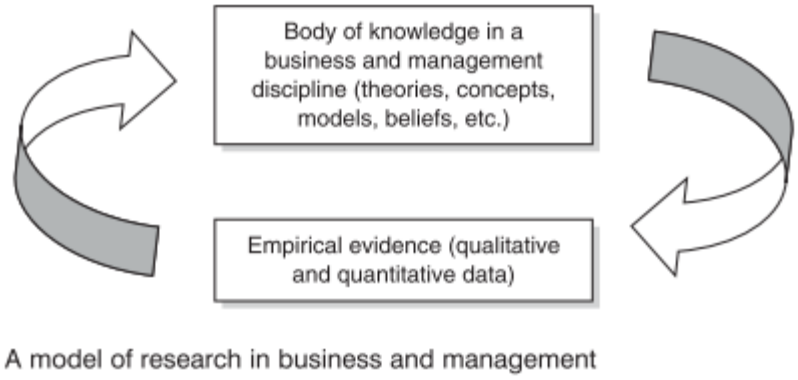

Figure 3. Simple empirical research model in Business and Management (Myers 2013: 11).

The key benefit of qualitative research is to produce the clarity of context, where actions and decisions happen. Also in real life business context, where the sample size has to be limited, qualitative method enables the researcher to reach the depth of the subject. On the contrary, quantitative method requires a large sample size, rigorous statistical evaluation of the data and focus on context can be lost in the process. (Myers 2013)

Looking into the business challenge and objective of the thesis with the above aspects in mind, the qualitative research method is chosen for the study. The qualitative research techniques of interviews, documents and texts and participant observation are applied in this study. However, there is a substantial amount of existing data, which are purely numerical in nature. To use and analyze the same, mathematical tools are needed. For

development of customer value calculator tool, standard project finance formulae have been used. Thus in addition to the qualitative research method, some mathematical data analysis and modeling have been employed in this study.

The next sub-sections describe the research design and data plan for the study, based on these conceptual decisions.

2.2 Research Design

As described in sub-section 2.1, this thesis follows the applied research approach with elements drawn from action research. The study is divided in five phases. There are three data collection stages to capture inputs required for the relevant phases. The data collection principally follows the qualitative research method, aided by some tools of numerical analysis, as and when required. Figure 4 represents the stepwise research design for the project. The input data plans are illustrated on the left-hand side of the figure.

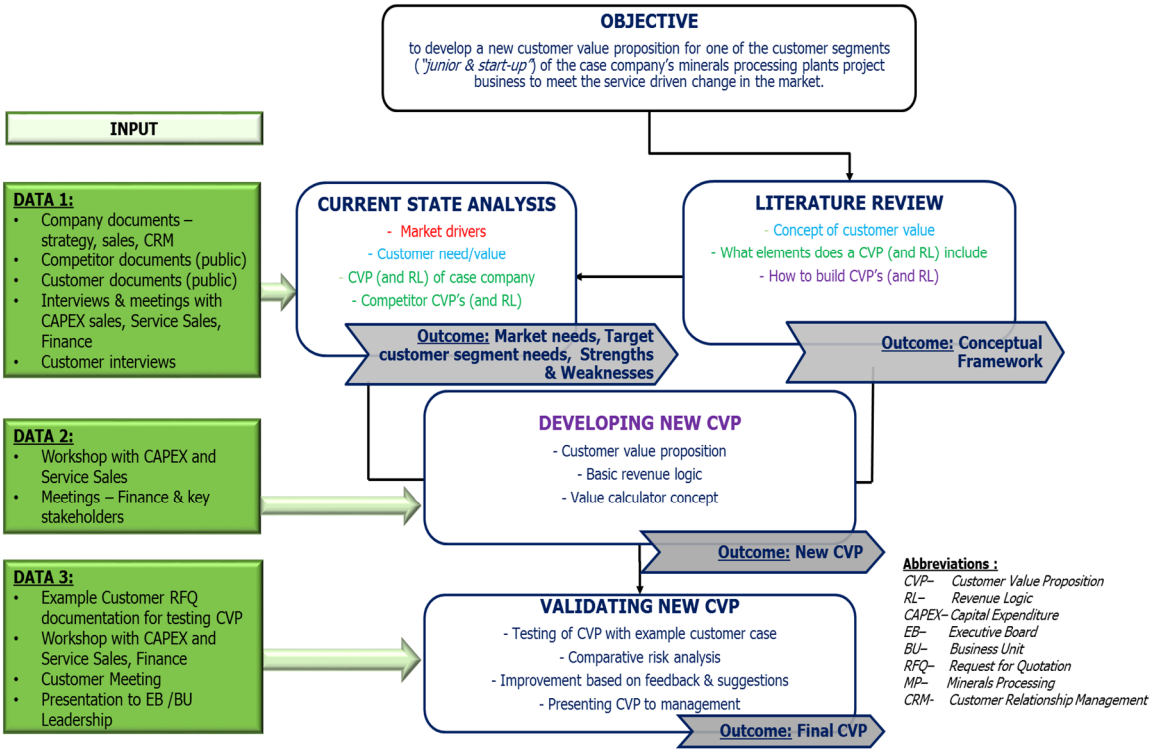

Figure 4. Research design of study.

As shown in the Figure 4, the sequential phases include identifying the business challenge and objective, literature research for conceptual framework, current state analysis for the business challenge, developing the solution and validation of the solution. The first step in the adopted research process is to identify the business challenge and setting up the study objective. After the study objective is established, which in this case is to

create new customer value proposition (CVP) for the case company, it is important to understand the existing CVP in the light of modern theories and best innovative practices reported in business literature. Therefore, the second and third phases of the research are partially overlapping, which are literature review and current state analysis respectively.

In the second phase i.e. literature review, the relevant literature from business management are reviewed extensively to understand the key elements influencing two subsequent phases i.e. current state analysis and developing new CVP. These elements are concept of customer value in information age; components of modern day CVP and revenue logic (RL); and building blocks of CVP and RL. The outcome of this phase is the conceptual framework, providing inputs to current state analysis phase and becoming the intellectual backbone for the development phase.

The third phase is current state analysis (CSA) of the existing CVP and RL of the case company. The aspects analyzed in this step are understanding of market drivers, customer need, analysis of existing CVP and RL in the context of business results and study of competitors' CVP and RL. The input data to this phase is generated through data collection stage-Data 1. Details of Data 1 is described in sub-section 2.3. The outcome of this phase is identified market needs, strengths and weaknesses of existing CVP and RL.

The fourth phase is developing the new CVP. The inputs to this phase are conceptual framework from second phase and current state analysis results from third phase. The new dynamic input data in this phase is obtained from data stage-Data 2, detailed in next sub-section. Process wise the following aspects are met: identifying target customer segment for new CVP, structure for new CVP and RL, competitive positioning of new CVP and concept of value calculator for demonstrating value to customers. The outcome of this phase is the new CVP.

The fifth and final phase is validation of the new CVP created in the preceding phase. In this phase, the data generated is covered in data stage-Data 3. The new CVP is tested with live customer cases and the results are analyzed in internal workshops and meetings to capture feedback and suggestions. The comparative risk analysis of alternate revenue models for delivering the new CVP is also done in this phase. The CVP improved from the feedback is then presented to Business Unit management and Executive Board members for approval and further action planning. The outcome of this phase is the final CVP structure.

2.3 Data Collection and Analysis

The research design plan explained in the preceding sub-section 2.2, involves three stages of data collection. The first stage of data (Data 1) was collected and analyzed during current state analysis phase. The second stage of data (Data 2) was collected and utilized in the CVP development phase. The third stage of data (Data 3) was collected and analyzed in the CVP validation phase. Data collected in each stage were partially different in nature from each other and had specific objectives. The summary of data collection plan is presented in Table 1 below.

Table 1. Summary of Data Collection Plan.

DATA PLAN	PURPOSE	DATA SOURCES	STAKEHOLDERS	SCHEDULE	OUTCOME
DATA 1 CURRENT STATE ANALYSIS	- Identifying customer need/value - Existing CVP (and RL) of case company - Competitor CVP's (and RL) at present	➢ Internal documents of case company--Strategy, Sales, Marketing, CRM & Delivery ➢ Strategy and other documents of customers & competitors, available publicly ➢ Industry reports ➢ Industry analysis reports ➢ Face-to-face(F2F) interviews (14) ➢ Customer interviews (Virtual/F2F) (4)	**KEY STAKEHOLDER TEAM:** ▪ Director-Digital Plant,MP ▪ Director-Plant Metallurgy, MP ▪ Director-Concept Development , Services ▪ SVP- Strategic Customers & Business Development (EB Member) ▪ Director-Plant Projects,MP ▪ Head of Solution Sales, MP ▪ VP-Concentrator Plant Solutions, MP **OTHERS:** Sales (4)+ Services (1)+ CRM(1)+ Technology (2) + Operation Excellence (1) + Finance (1)+ Customers (4)	Jan - Feb- 2018	▪ Market needs ▪ Target customer segment needs ▪ Strengths & Weaknesses of existing Customer Value Proposition (CVP)
DATA 2 DEVELOPING NEW CVP	- Identifying components of New CVP - Testing fit & competitive edge - Developing basic revenue logic - Customer value calculator concept - Identifying example customer case	➢ Workshop with CAPEX and Service Sales (1) ➢ Meetings with Finance (1) ➢ CRM data ➢ Key-stakeholder meetings (1)	**KEY:** Same as DATA 1 **OTHERS:** Sales (3)+ CRM(1) + Technology (1)	Mar-2018	New CVP
DATA 3 VALIDATING NEW CVP	- Testing CVP for example case - Comparative risk analysis - Identifying improvement areas in new CVP - Evaluation of new CVP	➢ Live sales case customer documentation ➢ Workshop with CAPEX and Service Sales, Finance (2) ➢ Customer meeting (1) ➢ Key-stakeholder meetings (1)	**KEY:** Same as DATA 1 **OTHERS:** Sales (4)+ Services(1)+ Market Area (2) + Technology (2) + Operation Excellence (1) + Finance (1)+ Customers (1)	Apr-2018	Final CVP

A key stakeholder team was internally formed in the case company to review the progress and findings of the study. The team composition is described in Table 1.

The data in this study can be categorized into two classes, i.e. existing secondary data (in the form of internal and public data, documents) and new primary data (as the result of internal and external interviews, workshops, meetings). For the new data, the qualitative research methodology was applied for data analysis. For the existing data, some mathematical tools along with qualitative research methods were applied for data analysis.

In the following, details of data collection and analysis in individual data stages are described.

2.3.1 Data 1

Data 1 was collected and analyzed in the current state analysis phase. This data stage consisted of five types of data. Secondary data consisted of internal data and documents from various disciplines (strategy, sales, market intelligence, customer relationship management (CRM), delivery, finance etc.); public data and documents on competitors and customers; and industry reports available in public domain. Primary data included interviews with internal stakeholders and interviews with customers.

For the interviews, two templates with different sets of questions were used. One template was used for interviewing the customers. The other one template was used for internal stakeholders, with varying questions depending on the role and function of the individuals. Both the templates are provided in Appendix 1 and 2 respectively. In Table 2 below, the interview and meeting details in this data stage are described.

Table 2. DATA 1 Interviews and Meetings.

S.No.	DATA ID	FUNCTION	POSITION	METHOD	DATE AND DURATION	MAIN TOPICS DISCUSSED	DOCUMENTATION
INTERNAL INTERVIEWS							
1	1D-p1	CRM (Sales Opn.)	Manager-Sales Operations, MP	Face-to-face interview	15/01/2018 30 minutes	Market dynamics, customer need, existing CVP and RL, strengths and weaknesses, business risk, competitor analysis, view on service logic, harmonizing CAPEX and service sales, digitalization	Field Notes + Audio Recording
2	1D-p2	Technology	Director-Plant Metallurgy, MP		16/01/2018 35 minutes		
3	1D-p3	Finance	Head-Corporate Controlling, Finance and Control		17/01/2018 35 minutes		
4	1D-p4	BU (Sales)	VP-Beneficiation Sales, MP		17/01/2018 1 Hour		
5	1D-p5	Plant Solutions (Sales)	Director-Solution Sales, MP		18/01/2018 45 minutes		

S.No.	DATA ID	FUNCTION	POSITION	METHOD	DATE AND DURATION	MAIN TOPICS DISCUSSED	DOCU-MENTA-TION
6	1D-p6	Plant Solutions (Delivery)	Director-Plant Projects, MP		23/01/2018 30 minutes		
7	1D-p7	Operational Excellence (Delivery)	Senior Manager-Operational Excellence/Digital Application		25/01/2018 35 minutes		
8	1D-p8	Risk and Market Intelligence (Sales)	Senior Manager-Risk Management and Market Intelligence, MP		29/01/2018 1 Hour		
9	1D-p9	Plant Solutions (Sales)	Senior Director-Solution Sales, MP		29/01/2018 50 minutes		
10	1D-p10	Plant Solutions (Sales)	Senior Manager-Solution Sales, MP		30/01/2018 1 Hour		
11	1D-p11	Services (Sales)	Director-Concept Development , Services		31/01/2018 1 Hour		
12	1D-p12	Technology	Technology Director-MP		06/02/2018 1 Hour		
13	1D-p13	Technology	Director-Geometallurgy and Project Evaluation, MP		08/02/2018 30 minutes		
14	1D-p14	Services (Sales)	VP-Products and Offerings, Services		14/02/2018 1 Hour		
CUSTOMER INTERVIEWS							
15	1D-c1	Junior	Process Director	Skype Interview	21/02/2018 35 minutes	Customer need, existing CVP and RL of case firm, strengths and weaknesses, view on value-in-use, market environment and technology disruptions	Field Notes + Audio Recording
16	1D-c2	Mid-tier	Group Manager-Processing		22/02/2018 30 minutes		
17	1D-c3	Major	Global Supply Manager – Innovation		26/02/2018 30 minutes		
18	1D-c4	Start-up	CEO		27/02/2018 30 minutes		

The internal stakeholders for the interviews were chosen from various associated functions involved with concentrator plant solutions sales, delivery and services sales. The customers have been categorized as either *major* i.e. established and big mining companies or *medium tier* i.e. established but relatively smaller companies or *junior* i.e. relatively new and smaller mining companies or *start-up* i.e. new entrants to mining industry. The data captured in the interviews were analyzed through thematic and content analysis.

In Table 3, the list of internal documents used for current state analysis are presented.

Table 3. Internal documents of Case Company used in DATA 1.

S.No.	DATA ID	DOCUMENT	DESCRIPTION	TYPE	AMOUNT
1	1D-d1	Operational Model	Operational model of case company	Intranet material	N.A.
2	1D-d2	Organization Structure	Organization structure of case company	Intranet material	N.A.
3	1D-d3	Internal Corporate Strategy 2018-2020	Corporate strategy and targets	Presentation	27 Slides
4	1D-d4	MP Strategy 2018-2020	Minerals Processing Business Unit strategy and targets	Presentation	8 Slides
5	1D-d5	Services Strategy 2018-2020	Services Business Unit strategy and targets	Presentation	28 Slides
6	1D-d6	Technology Strategy-2017	Technology strategy roadmap of case company	Presentation	20 Slides
7	1D-d7	CRM Data-MP BU	CRM data for customer segmentation, analysis of sales performance of concentrator plant solutions and related service sales	CRM Tool	N.A.
8	1D-d8	MP-Digital Solutions	Roadmap for digitalization solutions in MP-BU	Presentation	51 Slides
9	1D-d9	Digitally enabled improvements at mine/processing plant operations	Roadmap for digitalization solutions in MP-BU	Document	11 Pages
10	1D-d10	Plant Management Suite-2014	Concept for full visibility and control on plant operations	Document	6 Pages
11	1D-d11	Competitor Analysis-2017	Analysis of key competitors' strategy, financials and innovations	Presentation	36 Slides
12	1D-d12	Financial Statements-2017	Financial results of case firm for 2017	Report	31 Pages

In addition to the data and document list from above Table 3, industry analysis reports from reputed consulting houses, documents and materials available in public domain from six customers in the target segment and two competitors, have been analyzed as part of Data 1. In Table 4, the public documents of customers and in Table 5, the public documents of selected competitors are presented, which have been used in the study. For competitor analysis, two peer companies have been selected, Company X and Company Y. The details of the competitor companies are provided in Section 4.

Table 4. Public documents of customer companies used in DATA 1.

S.No.	DATA ID	CUSTOMER	DOCUMENT	AMOUNT
1	1D-d12	C-I	Corporate Presentation-March 2018	30 Slides
2	1D-d13	C-II	Investor Update Presentation-January 2018	36 Slides

S.No.	DATA ID	CUSTOMER	DOCUMENT	AMOUNT
3	1D-d14	C-III	Investor Presentation-January 2018	54 Slides
4	1D-d15	C-IV	Presentation in “Mines and Technology”-London 2017	33 Slides
5	1D-d16	C-V	Corporate Presentation—February 2018	35 Slides
6	1D-d17	C-VI	Corporate Presentation—December 2017	28 Slides

Table 5. Public documents of competitor companies used in DATA 1.

S.No.	DATA ID	COMPETITOR	DOCUMENT	AMOUNT
1	1D-d18	X	Investor Presentation- February 2018	18 Slides
2	1D-d19	X	Press Release	N.A.
3	1D-d20	X	Financial Statements-2017	92 Pages
4	1D-d21	Y	Capital Market Day Presentation-June 2017	13 Slides
5	1D-d22	Y	Copenhagen Winter Seminar-December 2017	42 Slides
6	1D-d23	Y	Annual Report- 2017	142 Pages

The data from Table 3, 4 and 5 were analyzed through content analysis.

2.3.2 Data 2

Data 2 was collected and analyzed in the proposal development phase (Developing new CVP). This data stage consisted of four types of data viz. results of current state analysis from Data 1 as an input, conceptual framework from literature review phase as an input, outcome of workshop held with internal stakeholders and results of meeting held with key stakeholders. In Table 6 below, the details of the qualitative part of the data stage are described.

Table 6. Details of Qualitative Data Collection in Data 2.

S.No.	DATA ID	FUNCTION	POSITION	METHOD	DATE AND DURATION	MAIN TOPICS DISCUSSED	DOCU-MENTA-TION
WORKSHOP							
1	2D-w1	Digitaliza-tion	Director-Digital Plant,MP	Workshop	08/03/2018 3 Hours	- Discussion on findings of CSA - Creating prototypes of new CVP by Identifying needs of target customer segment and then identify-ing solution elements	Workshop Notes
		Plant Solutions (Sales)	Head of Solution Sales, MP				
		Plant Solutions (Sales)	Director-Solution Sales, MP				

S.No.	DATA ID	FUNCTION	POSITION	METHOD	DATE AND DURATION	MAIN TOPICS DISCUSSED	DOCU-MENTA-TION
		Plant Solutions (Sales)	Senior Director-Solution Sales, MP			- Test problem-solution fit of all prototypes - Create minimum viable product (MVP) for new CVP - Create competitive edge - Developing alternate basic revenue logic models for new CVP	
		Plant Solutions (Sales)	Senior Manager-Solution Sales, MP				
		Plant Solutions (Delivery)	Director-Plant Projects, MP				
		Services	Director-Concept Development , Services				
		Technology	Director-Plant Metallurgy, MP				
		Plant Solutions (Sales)	Director-Solution Sales, MP				
		Proposals Manage-ment (Sales)	Director-Proposal Management, MP				
		Risk and Market Intelligence	Senior Manager-Risk Management and Market Intelli-gence, MP				
		Technology	Senior Process Metallurgist, MP				
KEY STAKEHOLDER MEETING							
2	2D-m1	Key Stake-holder Team	See Table 1	Group Meeting	19/03/2018 1.5 Hours	Review of results of CSA and customer feedback; proposal development work. Provide guidance for CVP structure and customer test case selection.	Field Notes

The participants in the workshop were chosen from various associated functions involved with concentrator plant solutions sales and delivery and post CAPEX services sales. In Table 7, the list of internal documents used for proposal development stage are presented.

Table 7. Internal Documents of Case Company Used in DATA 2.

S.No.	DATA ID	DOCUMENT	DESCRIPTION	TYPE	AMOUNT
1	2D-d1	CVP Tool-MP	Existing value calculator tool for concentrator plant solu-tions	Internal Tool	N.A.

The above tool is used for creating the new value calculator tool for demonstrating customer value in new CVP. Standard numerical analysis tools and functions used in project finance have been used for developing the tool.

2.3.3 Data 3

Data 3 was collected and analyzed in proposal validation phase (Validating new CVP). This data stage consisted of five types of data viz. test results of new CVP and value calculator tool for example customer case through workshop; test results of new CVP for another example customer case through Email communications; review, validation and feedback on new CVP and value calculator tool through workshop and meeting; feedback from customer meeting; and lastly, the feedback from key stakeholder and management approval meeting. In Table 8 below, the details of the qualitative part of the data stage are described.

Table 8. Details of Qualitative Data Collection in Data 3.

S.No.	DATA ID	FUNCTION	POSITION	METHOD	DATE AND DURATION	MAIN TOPICS DISCUSSED	DOCUMENTATION
WORKSHOPS							
1	3D-w1 and w2	Digitalization	Director-Digital Plant,MP	Workshop	29/03/2018 2.5 Hours and 06/04/2018 2 Hours	- Review results of new CVP and basic RL for example case-A - Risk comparison - Revisiting competitive edge - Identifying improvement areas in new CVP and RL - Evaluation of new CVP and RL	Workshop Notes
		CRM (Sales Opn.)	Manager-Sales Operations, MP				
		Plant Solutions (Sales)	Director-Solution Sales, MP				
		Plant Solutions (Sales)	Senior Director-Solution Sales, MP				
		Solution Lead for Test Case-A	Director-Solution Sales, MP				
		Risk and Market Intelligence	Senior Manager-Risk Management and Market Intelligence, MP				
		Plant Solutions (Sales)	Senior Manager-Solution Sales, MP				
		Plant Solutions (Delivery)	Director-Plant Projects, MP				
		Services	Director-Concept Development , Services				
		Technology	Director-Geometallurgy and Project Evaluation, MP				
		Technology	Director-Plant Metallurgy, MP				
		Plant Solutions (Sales)	Head of Solution Sales, MP				

S.No.	DATA ID	FUNCTION	POSITION	METHOD	DATE AND DURATION	MAIN TOPICS DISCUSSED	DOCUMEN-TATION
		Proposals Manage-ment (Sales)	Director-Proposal Management, MP				
REMOTE COMMUNICATIONS							
2	3D-e1	Customer Lead for Test Case-B	Sales Lead-MP, MA-NCA	Emails and phone calls	02-06/04/2018	- Inputs to CVP structure for test case-B - Review results of test case-B	Emails
		Solution Lead for Test Case-B	Head-Concentra-tor Solution Sales, MA-NCA				
FINANCE REVIEW MEETING							
3	3D-m1	Finance	Head-Corporate Controlling, Finance and Control	Meeting	13/04/2018 1 Hours	-Review and valida-tion of value calcula-tor tool	Field Notes
CUSTOMER MEETING							
4	3D-c1	CEO, Test Customer-A	N.A.	Meeting	16/04/2018 1 Hours	-Feedback on new CVP approach	Field Notes
KEY STAKEHOLDER AND MANAGEMENT APPROVAL MEETING							
5	3D-m2	Key Stake-holder Team	See Table-1	Group Meeting	16/04/2018 2 Hours	- Review of Final CVP and basic RL - Approval decision - Future action plan	Field Notes
		Solution Lead for Test Case-A	Director-Solution Sales, MP				

The participants in the validation workshops were chosen from various associated functions involved with concentrator plant solutions sales and delivery and post CAPEX sales services.

In Table 9, the list of internal documents used for proposal validation stage are presented.

Table 9. Internal Documents of Case Company Used in DATA 3.

S.No.	DATA ID	DOCUMENT	DESCRIPTION	TYPE	AMOUNT
1	3D-d1	Customer RFQ and associated proposal and/or project documents for Case-A	Existing documentation from ongoing sales case, which is selected for testing	Internal Documents	N.A.
2	3D-d2	Customer RFQ and associated proposal and/or project documents for Case-B	Existing documentation from ongoing sales case, which is selected for testing	Internal Documents	N.A.

Content analysis and standard numerical analysis tools have been used in this phase.

The outcome of this data is the Final Proposal (Final CVP) for management decision. The validation and reliability of the thesis work, including the data collection and analysis, are presented in sub-section 7.3.

The existing knowledge in service oriented CVP innovation is presented in the following section.

3 Existing Knowledge on Service Oriented CVP Innovation

In this section, the existing knowledge and modern approaches for service oriented CVP innovation are discussed in the context of B2B industry settings. First, the theories of service orientation in customer value are discussed along with the need for customer centricity. These form the core foundational concepts for the goal of CVP innovation in the study. Key elements of CVP and revenue logic are identified next, which is followed by concepts of CVP strategy and outlook required for achieving customer fit, creating competitive edge and demonstrating the value proposition to customers. Fourth, the CVP innovation stages are investigated to formulate the innovation process and to find the required tools. Finally based on these findings, the conceptual framework for the study is presented. The framework works as the backbone for providing inputs to the current state analysis, building the CVP and final validation of the new CVP.

3.1 Customer Value Concept

In the last two-three decades, the ever-increasing speed of technology innovations and resulting lower barriers of entry have changed the way global business is done. To meet the challenges, the companies either continue to add features and make upgrades to the products and services, or bundle them in solution offerings, or try to reduce costs by optimizing the cost structure. Due to the high speed in technology advancement, the new features and upgrades ultimately end up having low shelf life. In addition, these ideas are challenged by the new age customers, who are well connected, informed and active. Intelligent customers take away the cost advantage through smart business negotiations and global competition, creating price erosion (Prahalad and Ramaswamy 2004: 6-7). These factors drive the companies through a vortex phenomenon, which finally commoditize the flagship products and eventually make them obsolete (Bean and Van Tyne 2012: 11-13). In many cases, companies slowly go out of business.

However, some companies have realized the importance of another key dimension to survive and prosper in this complex business environment. They have understood that focus on customer needs and experience is the new currency in “current age of the customer” (Manning and Bodine 2012).

Any customer is eager to be loyal, make re-purchases, promote the provider firm and ready to pay more, if the total experience of the entire journey with the provider is novel and satisfying (Manning and Bodine 2012 ; Bean and Van Tyne 2012). The results are more visible and popular in direct consumer centric industries, which are typically known

as Business to Consumer (B2C) industry, but the underlying elements remain the same, irrespective of B2B or B2C industries.

In the past four to five decades, personal selling has evolved from consultative to strategic selling to current partnership era (Manning et al. 2016). In B2B context, where both business operations and transactions are highly complex in nature, value selling through strategic sales or partnership sales techniques have become critical for success. The two facets of these styles of selling are realizing customer need accurately through customer centricity and then relating it to customer value through the offerings. For value selling in B2B context, customer value can be defined in two ways: desired value and perceived value. The same is described in Figure-5 below.

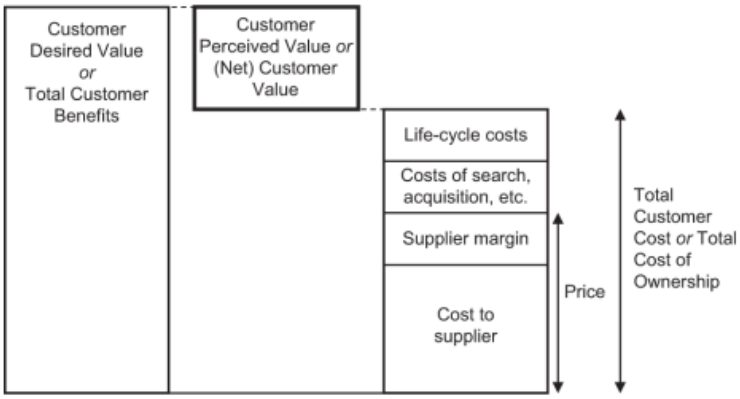

Figure 5. Desired and Perceived Customer Value (Töytäri et al. 2011: 494).

As depicted in Figure 5, while desired value (benefits) reflects the total need of customer from a solution or product or service for specific usage to achieve business goals, the perceived value on the other hand is the difference between desired value (benefits) and total cost to the customers (sacrifices) (Töytäri et al. 2011: 494).

The next discussion is focused on the evolving theory of value-in-use as customer value and how the benefits-sacrifices trade-off is extending over the life cycle of underlying core businesses.

3.1.1 Value-in-Use: Service Orientation and Service Logic

In prevalent modern economics, objects (goods, products, matter) having inherent utilities and relationships to other objects, are measured at the points of sale (POS) in terms of price mechanisms and value-in-exchange (Lusch et al 2007). This product centric view dominated the marketing theories and practices for better half of the last century, where product or output units are considered as the main exchange components at singular or multiple exchange points spread spatially and temporally.

However, no real value is created for customers at the points of exchange. Instead, the customers receive a value-promise for potential value generation from usage of the solutions and systems, sourced from the providers. The true value is generated while the exchanged objects are used for specific purposes by the customers. This is termed as value-in-use and is cumulative and continuous by nature. When this concept is looked through customer lens, it brings about a new perspective, where all products, services and solutions are considered as service to facilitate value creation and co-creation. This perspective is coined as service logic (Grönroos and Voima 2012), a major theory of emerging interdisciplinary field of service science. Service logic perspective postulates three spheres (Figure-6) to elaborate the value creation process and they are provider sphere, joint sphere, customer sphere (Grönroos and Voima 2012).

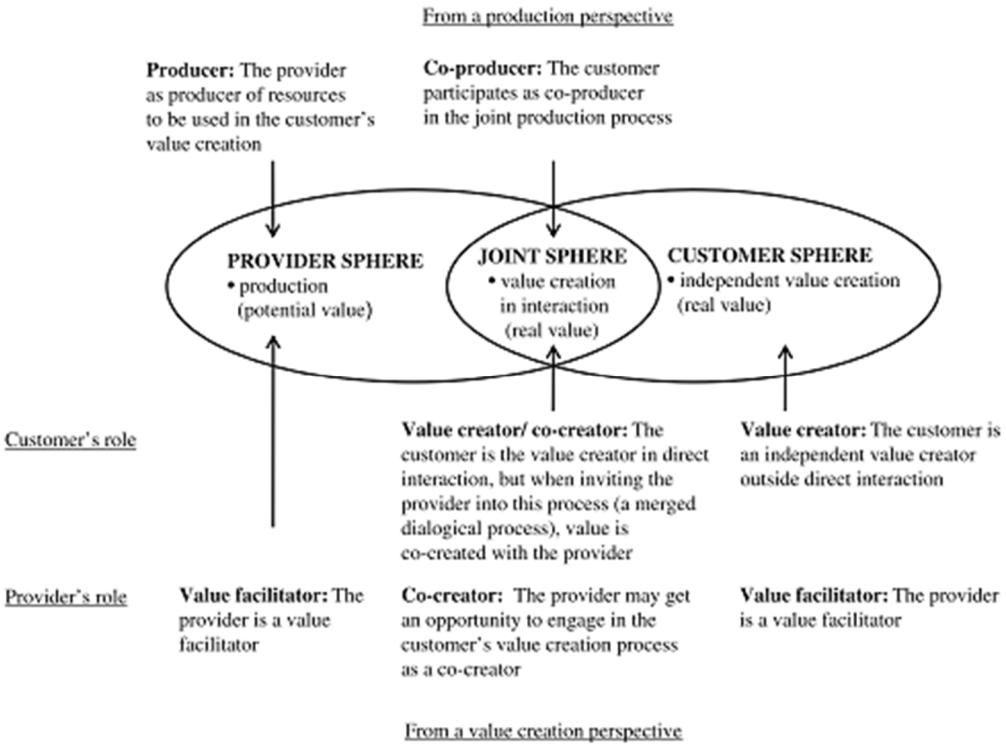

Figure 6. Value Creation Spheres (Grönroos and Voima 2012: 141).

As shown in Figure 6, according to Grönroos and Voima (2012), value in service logic is created by the customer as value-in-use. The value co-creation by the provider and the customer happen only during the exchange process in the joint sphere. During the usage process, the provider firm acts as the value facilitator while the customer becomes the primary value creator, within and much beyond the joint sphere. From provider point of view, the success in expanding the joint sphere increases the value creation for self. (Grönroos and Voima 2012)

Expanding the reach in value-in-use with consistent focus to enrich customer experience creates continuous value streaming, reduction of competition in life-cycle of customer's business and increased customer loyalty. Meanwhile, the provider firm and the customer are both collaborators and competitors at the same time in value co-creation and delivery model. They act as collaborators during value creation and as competitors during economic value distribution. As there are multiple interactions in the system including the conventional point of exchange or sale, the co-creation framework defines all these interaction points as value creation points (Prahalad and Ramaswamy 2004: 10-11).

The concept of value-in-use from service logic perspective acts as the foundation for CVP innovation goal in this study. However, it is also imperative to understand the value-in-use in B2B industrial contexts of both the engineering and construction sector and the customer domain of mining industry.

3.1.2 Service Logic in B2B Industry

In B2B engineering and construction sector, the prevalent business models are product centric and products are typically equipment and/or projects. The customer feedback is gathered commonly through sales channels at/after the points of sales as in most B2B industries. However, the insights are missing from concept developers, users, influencers and so forth, thus missing a great part of the customer journey (Fanderl et al. 2016).

Mining industry, one of the broader customer segments in this sector, is also essentially capital intensive, historically conservative and dominated with product centricity. Nevertheless, customers in B2B capital intensive industries such as mining are becoming aware of the Life Cycle Cost (LCC) of their projects and therefore interested in optimizing the same. As a result, project based firms involved in integrated solution deliveries are combining various goods and services for customer value creation. The typical division of offering in projects business is illustrated below in Figure 7.

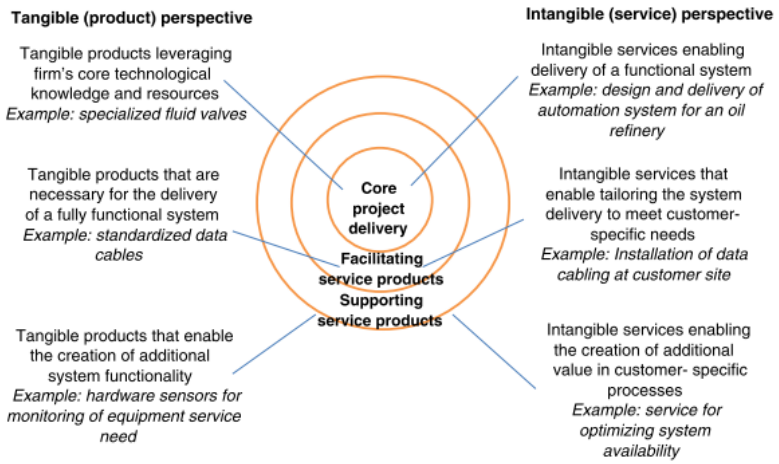

Figure 7. Elements of a Solution Delivery (Kujala et al 2013: 179).

Figure 7 above illustrates the division of offering from project firms into three elements namely core project delivery, facilitating service products and supporting service products. These elements are analyzed from tangible (product logic) and intangible (service logic) perspectives (Kujala et al. 2013). This service perspective provides an outlook of meeting customer jobs directly.

Since the challenges are relatively new, there are yet to be classic examples of CVP and business model innovations in B2B technology and projects companies. However, in following Table 10, some of the relatable and notable examples from other B2B industries are summarized (Tekes Review 2010; Osterwalder et al. 2014).

Table 10. Selected case-studies of service oriented innovations in B2B industries.

Company Description	Core Competence	Customer Industry Segment	Innovation in CVP	Value Element	Innovation in Revenue Logic
Rolls-Royce, UK	High tech engineering and manufacturing of aircraft engines	Airlines	Instead of selling aircraft engines as products and then spares/maintenance as services, the CVP was changes to "uptime" model i.e. running hours of engine was made as the value element for the customers. To ensure the same, services are provided through a global service network.	Value-in-use : Use of aircraft engine for core business of customers i.e. air transportation	Customers pay fee for every hour that the purchased engine operates.
Cemex, Mexico	Production of building materials	Construction Industry	Instead of selling cement/ready-mix concrete as product, the CVP was changed to selling just-in-time delivery of them. Since the result was reduction in material loss and lower inventory level of the customers, the customers accept to pay premium price in this model.	Value-in-use : Timing of use of building materials	Customers pay premium for promised on-time delivery in addition of regular commodity prices. On the other hand, they receive discounts for later delivery.
Hilti, Liechtenstein	Manufacturing machine tools	Construction, mining industry	Changing from product centric machine tool sales, the CVP was changed to leasing tool fleet management services with the goal to ensure availability of machine tools for the construction companies.	Value-in-use : Availability of usage of machine tools for core operation of customers i.e. construction activities	Customers pay by subscription fee based model and they have choices to select from various levels of subscriptions.

In the next sub-section, the key elements of CVP and revenue earning logic are looked into.

3.2 Elements of CVP and Revenue Logic

Once the value source is identified, for which the provider can propose a solution through bundling of products and services, then two critical issues arise. First, the value needs to be communicated to the customer in clear, logical form and the argument needs to be accepted by the customer over competitor arguments. In essence, the value capture depiction by the provider to the customer through the offerings is known as customer value proposition (CVP). Second, the provider value share needs to be captured through a profitable revenue earning logic, which is also reasonable and acceptable for customers.

The first element of CVP is the firm's core competence area. Core competence of an organization can be defined as the ever-increasing and evolving collective learning through continued and coordinated usage, integration, growth and refinement of multiple technologies and diverse production skills (Prahalad and Hamel 1990: 82). Core competence generates core products and services, which are perishable and changeable with time, unlike core competences. In B2B perspective, the core competence can be a strength in technology and product innovation, reliability of solutions measured through installed base and references, life cycle service support for provided goods and services, low cost of offerings, capability for faster delivery, and better quality than industry standard and so forth.

The second element of CVP is clarity in understanding the real need of the customer and discovering true value generating sources for the customer. The underlying reason for CVP innovation needs to be understood as well, whether it is driven by technology push from recent invention, innovation of technologies or it is driven by the market pull of customer and market needs or a combination of both (Osterwalder et al. 2014).

The third element of CVP consists of the value enablers arising out of provider's core competence area, which fit in the customer need and potential value creating sources.

The fourth element of CVP is the edge over competitor's propositions targeting the same customer value. The fifth element is the strategy and outlook for customer value demonstration with credible evidences from past successes. The final element is the fit of CVP with the internal business model to deliver promised value to the customer seamlessly, while ensuring own growth and profitability.

3.2.1 Value Enablers in CVP

In the premise of CVP innovation, the first important aspect is to understand the true value enablers for the customers and then design the CVP wrapped around them. To

execute the concept, the first step is to identify the end goals customer want to achieve and the utility of provider's core competence in the same for either solving certain pain areas in customer's business or creating additional gains for customers. While understanding customer needs, these value enablers can be visible explicitly or implicitly in the customer discussions or can be even beyond the perceived reality of the customers.

These needs, existing or new for customers, are termed as 'customer jobs to be done' (Christensen et al. 2016; Osterwalder et al. 2014; Johnson et al. 2008) or 'customer needing' (Strandvik et al. 2011). In one approach, Strandvik et al. (2011) have proposed the customer needing dimensions and have described the related need functions, which can be used for desired value mapping of customers. Customer need dimensions and need functions are shown in Table 11.

Table 11. Customer need dimensions and need functions (Strandvik et al. 2011: 136).

Needing dimension	Needing function	Function definition
Doing **A resource and activity oriented dimension**	Relieving	Value in use realized by being relieved of performing tasks or carrying liabilities in current or future business activities
	Enabling	Value in use realized by getting additional resources, competence or capabilities that enhances the buyer's performance and activities within their current business or enables them to create new business
Experiencing **A cognitive and emotional dimension**	Sheltering	Value in use realized by being able to control risks and unwanted fluctuations in current or future business
	Energizing	Value in use realized by getting inspiration and motivation to perform activities in current and future business
Scheduling **Time-based dimension**	Time framing	Value in use realized by adaptation to expected time frame and pattern of development of current and future business
	Timing	Value in use realized by suitable timing of activities in current and future business

In this approach, customer needs are analyzed from the mental model perspective, while identifying value-in-use for specific business activities. As shown in Table 11, the first need dimension is termed as 'doing', a physical resource-activity centric dimension, which is further categorized in two different functions i.e. either relieving customers of certain responsibilities, or enabling them to add capacity and capabilities. The second dimension is experiencing, a cognitive and emotional dimension, which is further categorized in two different functions as either provision of shelters to customers for mitigating and controlling specific business risks, or injecting energy in form of inspiration and motivation to create better business performance. The third dimension is time based dimension, where needing functions can be either understanding the buyer perspective of time-frame generating value or simply timing of business activities. (Strandvik et al. 2011)

In another parallel school of thought, 'job' is considered as a "*fundamental problem in a given situation that needs a solution*" (Johnson et al. 2008). Customer jobs are categorized in four principal types: functional jobs for executing specific tasks or solving a problem; social jobs as being perceived by other stakeholders in customer's context; emotional jobs such as mitigating risk, increasing reliability; and supporting jobs such as involvement in buying process, managing suppliers so forth (Osterwalder et al. 2014). While understanding customer jobs, the context needs to be understood as well, because at different temporal points, the same customer may have different needs for the outcome of the same job.

In B2B perspective, the situation is quite complex as there are several stakeholders involved in the buying process from the customer side and each one of them has own jobs to be done. These stakeholders can be categorized as influencers, recommenders, economic buyers, decision makers, end users and saboteurs. The key is to identify the most important jobs and dominant interest in the stakeholder group. Also B2B domain is wide in breadth, thus requiring to identify target customer segment before doing the customer profiling and identifying the needs. (Osterwalder et al. 2014)

The identified customer jobs and needs are to be evaluated to discover customer's pain and gain areas. Pain areas are usually known to customers and can be explicitly found out with proper customer centric communication. They can be actual undesired outcome, barriers in the customer's business or they can be anticipated risks. On the contrary, gains can be either known or undiscovered territories for customers. The known gains are essential and mandatory in provider's offerings, expected gains are for differentiation from provider's competitors and desired gains are usually not part of the industry standard offerings. The unknown gains are the unexpected values in the provider's CVP, which can act as a game changing proposition for the industry and create new benchmarks for the future. (Osterwalder et al. 2014)

Value enablers emerge from the identified customer jobs, pain and gain areas, when they are compared with the provider's core competences, product and services portfolio. This is a process of distinguishing between features and benefits. Features are simply general facts, data, development history and properties of the sales mix chosen by provider in the offering, while benefits are the outcome of using certain features in the offering in a certain way (Manning et al. 2016: 158-159). These benefits or value enablers for customers can be classified in the same way as the value generating sources in customer sphere i.e. pain relievers or gain creators. A well designed CVP vividly highlights specific features in the offerings, to be either alleviating certain customer pains or serving

potential gains. Again as in profiling customer needs, the pain relievers and gain creators can be classified as essential, expected, desired and unexpected. The necessary characteristic of a value enabling process is the identification of the most important enablers in offerings, matching specific pain or gain areas of customers. No CVP can meet all the pain and gain areas and no provider has the offerings to meet all the important customer needs (Osterwalder et al. 2014). However, it is also crucial in value innovation to think beyond the traditional prevalent industry offerings to create the solution desired by customer (Kim and Mauborgne 2004).

The selected value enablers need to be compared with value sources in customer sphere, so that customer fit can be assessed. Also the differentiating points from competition are to be selected. Demonstrating these findings to customers clearly and logically is vital to the success of new CVP. Simultaneously, the business model of provider needs to be analyzed against the new findings from CVP innovation, so that required changes are noted, potential actions are highlighted and growth-profitability analysis are made to decide on the viability of new CVP. The customer fit, business model fit, competitive edge and customer value demonstration are discussed in detail in following subsection 3.3. But preceding the same, the position and implication of CVP in business model need to be understood. Next, the role of CVP in business model is presented.

3.2.2 Position of CVP in Business Model

In today's fast changing world, disrupted by technology innovations in every walk of life and affected by various socio-economic and political phenomena, new innovative business models are emerging almost every other day. Few of them are creating new trendsetters, while the rest go to oblivion with time. In principle, a business model can be described as the rationale for value creation, delivery and capture by an organization (Osterwalder and Pigneur 2010).

The simplistic structure of a business model can be broken down into four interrelated elements i.e. customer value proposition (CVP), profit formula, key resources and key processes. CVP is the first element to be established to help the customer for getting the jobs done, as explained in the preceding discussion. This element establishes not only what to sell, but how it is to be sold. The second element is the profit formula, which consists of revenue model, cost structure, margin model and speed of resource utilization for delivering the CVP. The third element is key resources which consist of various tangible and intangible assets such as people, technology, facilities, channels, partners, brand equity etc. The fourth element is the key processes, comprising of business processes (both operational and corporate), company rules, standards, metrics and norms.

While the first two elements define value generation for both provider and customer, the last two elements describe the delivery of such value for both entities. (Johnson et al. 2008)

When this is expanded in another view of business model canvas, there are nine building blocks for a business model (Osterwalder and Pigneur 2010), which again is a detailed break-down of the business model structure, described above. The nine components are customer segments, customer relationships, channels, value proposition, key processes, key resources, key partners, cost structure and revenue streams (Osterwalder and Pigneur 2010).

For an existing organization, CVP innovation is a sensitive topic as it demands changes in the business model. A new path breaking CVP, based on game changing products and services and/or breakthrough value proposition, rarely emerges from established businesses, as it more often requires a totally new business model or complete makeo-ver (Johnson et al. 2008). However, pioneer companies successfully manage portfolio of a range of value propositions, based on flexible and interchangeable business models with a clear blueprint for synergy and minimizing competitive conflicts (Osterwalder et al. 2014). The old business model may not be necessarily changed, if the new CVP still works with existing earning logic, utilizes current resources and processes, and bulk of the existing metrics and rules still apply (Johnson et al. 2008).

While evaluating the choices during CVP innovation in established companies, the fol-lowing improve-invent spectrum for business model (Figure 8) suggested by Osterwalder et al. (2014) can be utilized.

Objective	Design new value propositions regardless of the potential constraints given by existing value propositions and business models (although leadership may define other constraints).	Improve your existing value proposition(s) without radically changing or affecting the underlying business model(s).
Helps With	• Proactive bet on the future • Take on a crisis • Emergence of a game-changing technology, regulation, etc. • Response to a disruptive value proposition of a competitor	• Renew outdated products and services. • Ensure or maintain fit. • Improve profit potential or cost structure. • Keep growth going. • Address customer complaints.
Financial Goals	At least 50 percent annual revenue growth (caveat: company-specific)	0 to15 percent annual revenue increase or more (caveat: company-specific)
Risk and Uncertainty	High	Low
Customer Knowledge	Low, potentially nonexistent	High
Business Model	Requires radical adaptions or changes	Little change
Attitude to Failure	Part of learning and iteration process	Not an option
Mind-set	Open to exploring new possibilities	Focused on making one or several aspects better
Design Approach	Radical/disruptive change to value proposition (and business model)	Incremental change and tweaks to existing value proposition
Main Activities	Search, test, and evaluate	Refine, plan, and execute

Figure 8. Invent-Improve Spectrum (Osterwalder et al. 2014: 160-161).

As depicted in the above figure, the ‘improve’ side of the spectrum calls for fine-tuning and minimal changes in the business model to adopt the innovated CVP. However, the

'invent' side of the spectrum demands radical changes in the business model to fit in with the new CVP, even possibly a new business model, and therefore possesses maximum risks as well. Sometimes, the in-between model of 'extend' is the workable solution i.e. to find the new CVP which extends the existing business model substantially, but refrains from changing the underlying core elements of it. (Osterwalder et al. 2014)

One of the key issues in evaluating CVP innovation vis-à-vis changes in the business model is the impact on financials i.e. growth and profitability. In both these aspects, the first and common matter of interest is the revenue earning logic, which is discussed in the following sub-section.

3.2.3 Revenue Logic

The principal reasoning of CVP innovation is to create value for the firm itself, while generating value for the customers. The inbound value is measured through the earning logic, which is a measure of the difference of the two elements of the business model i.e. revenue streams and the cost structure. A revenue model is central to the earning logic, which is a critical test of any CVP's success. Revenue logic has two impacts; the first is on the sales growth and the second is on the profitability.

There are various theories of arriving at a revenue model, which by simple definition is the product of price and volume. The price is mostly determined by calculating the cost structure and then adding the required gross margin to maintain target profitability. However, one interesting school of thought is to set the price in the first place and then calculate backwards to find the required cost structure and gross margin, which in turn analyzes the scale of volume and resource velocity required to ensure profitability (Johnson et al. 2008).

The revenue model consists of revenue streams, which are essentially of two types, i.e. transactional one-time revenues and recurring revenues for a certain or indefinite time span. There are several ways to generate both these revenue streams. Selling ownership of physical assets or services is the most popular and traditional way of generating one-time revenue. Fees per use, fixed subscription model, license fees for usage rights of intellectual property and leasing models are some of the methods which are used for creating recurring revenue streams. (Osterwalder and Pigneur 2010: 30-31)

In the next sub-section, the CVP strategy in terms of customer fit, competitive edge and business model fit are discussed, along with methods for demonstrating value to customers.

3.3 Finding Focus Value for CVP

As discussed in previous sub-sections, the fit of CVP with customer needs and own business model, followed by creation of competitive edge are essential to develop a winning CVP. These factors together form the CVP strategy. CVP strategy is at the core of customer strategy, which can be defined as a plan thoughtfully designed to create maximum impact on the customer needs (Manning et al. 2016). At the same time, the outlook of CVP to customers, through which customer value is demonstrated is central to the winning process.

3.3.1 Fit and Competitive Edge

As described in sub-section 3.2, the identification of customer's needs, value sources and then creating value enablers in CVP are the foundational steps in CVP design. However, the fit between value enablers and customer's pain and gain areas determines the level of potential success. A customer fit can and must be searched for by the provider during CVP design phase, but the real test of fit is done by the customers who are having the rights to judge and execute the value proposition.

A fit is achieved through three sequential stages. The first two stages are customer fit. The first is the fit found by the provider during the CVP development stage between value enablers and customers' needs. This is called 'problem-solution' fit. The second stage of the fit is in customer sphere, where the customer reacts positively to CVP, adopts it through a buying process and creates real value in line with guidance provided in CVP. This in-market fit is called 'product-market' fit. The third stage of the fit is provider fit, applicable to business model, when the first two stages of the fit triggers scalable growth and profitability in the provider sphere. (Osterwalder et al. 2014)

The third stage of the fit i.e. business model fit needs to be conceptualized and estimated during CVP design and profit logic creation. Even though the process is lengthy and iterative in nature, in existing organizations the knowledge of prevalent cost structure, people and processes provide a cognitive early insight, which can be used to arrive at more accurate value enablers and earning logic. After customer and business model fit evaluation, the next aspect of CVP design is finding the competitive edges to stand out from competition. Anderson et al. (2006) classified value proposition into three types—all benefits, favorable points of difference and resonating focus. This classification is presented in Table 12.

Table 12. Alternative ways of CVP (Anderson et al. 2006: 93).

VALUE PROPOSITION:	ALL BENEFITS	FAVORABLE POINTS OF DIFFERENCE	RESONATING FOCUS
Consists of:	All benefits customers receive from a market offering	All favorable points of difference a market offering has relative to the next best alternative	The one or two points of difference (and, perhaps, a point of parity) whose improvement will deliver the greatest value to the customer for the foreseeable future
Answers the customer question:	"Why should our firm purchase your offering?"	"Why should our firm purchase your offering instead of your competitor's?"	"What is *most* worthwhile for our firm to keep in mind about your offering?"
Requires:	Knowledge of own market offering	Knowledge of own market offering and next best alternative	Knowledge of how own market offering delivers superior value to customers, compared with next best alternative
Has the potential pitfall:	Benefit assertion	Value presumption	Requires customer value research

There are three common building blocks, namely points of parity, points of difference and points of contention, for all the three alternate and progressively complex ways of CVP presentation. Points of parity are elements, which have same performance or contribution as those of the closest competitor. Points of difference are elements, which are better/worse or additional/missing in CVP, when compared to the next best alternative for customer. Points of contention are elements, on which the provider and customer disagree for existence, superiority, requirement etc. The focus in successful CVP design is to identify the points of difference and points of parity through resonating focus approach for beating the competition and standing-out in customer's eyes. (Anderson et al. 2006)

While innovating CVP in B2B industry through service logic, the CVP strategy can take various patterns. Kowalkowski et al. (2015) suggest three possible ways for traditional product driven system suppliers, as presented in following Figure 9.

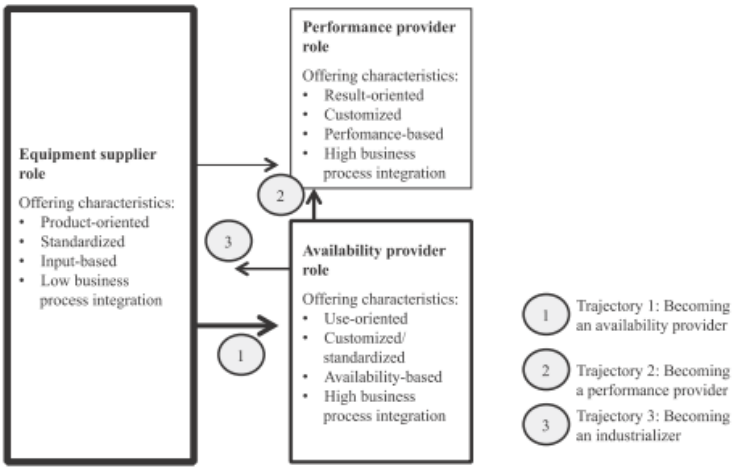

Figure 9. System supplier role and service-growth trajectories (Kowalkowski et al. 2015).

As depicted in the above figure, the provider can adopt either route or combination of the three roles for different customer segments: availability provider (the popular pathway); performance provider (extension of project based solution selling approach); or becoming industrializer (offering standardized, repeatable and scalable solutions which were previously delivered as customized solutions) (Kowalkowski et al. 2015).

The next discussion is on CVP outlook i.e. how to demonstrate value to customers.

3.3.2 Demonstration of Value to Customer

Once the CVP has been created, the next step is to create intelligent offerings, which substantiate and demonstrate the customer value. Use of references, case studies, highlighting critical points of differences, value word equations, value calculators etc. are some of the tools used in offerings for this cause (Anderson et al. 2006).

The process can be divided in three steps. The first step is substantiation of CVP and in addition to critical points of difference, value word equation can be an effective tool for this step. Value word equation is a simple equation consisting of keywords and simple mathematical operators to highlight the comparative difference between provider's and competitors' value propositions (Anderson et al. 2006). The second step is demonstrating the value to the customer through use of credible references and value calculators. Value calculators are techno-economic modeling and simulation software, used in consultative selling approach to demonstrate potential value generation for specific customer case (Anderson et al. 2006). However, looking through customer lens, the value quantification is an iterative and co-creative process with customer to establish reliability and acceptance (Töytäri et al. 2011). Credible referencing is a well-accepted logic to customers. But the value generated by customers in post-sales phase need to be documented along with customer feedback for creating credible references (Töytäri et al. 2011). This is the third step of the process.

In the next sub-section, the stages of CVP innovation are discussed.

3.4 CVP Innovation Stages

The discussion so far on the CVP components, revenue logic, CVP strategy and outlook provides the required insights for CVP innovation. However, CVP innovation is a process and certain stages need to be followed for creating a successful CVP. Several approaches and tools for service oriented CVP innovation are found in literature (Johnson et al. 2008; Patala et al. 2016; Åkesson et al. 2016), but the detailed and structured approach presented by Osterwalder et al. (2014) is found to be more suitable to follow.

The approach is not limited by the service lens and the process is equipped with required insights for both new and existing companies.

In short, CVP innovation consists of four stages, canvas, design, test and evolve (Osterwalder et al. 2014). In the following, the summary of innovation stages with relevant tools and approaches are described, which is an essence of framework presented by Osterwalder et al. (2014).

The first stage is to create the value proposition canvas, which comprises of creating customer profile, value map and fit. The value proposition canvas is presented in following Figure 10.

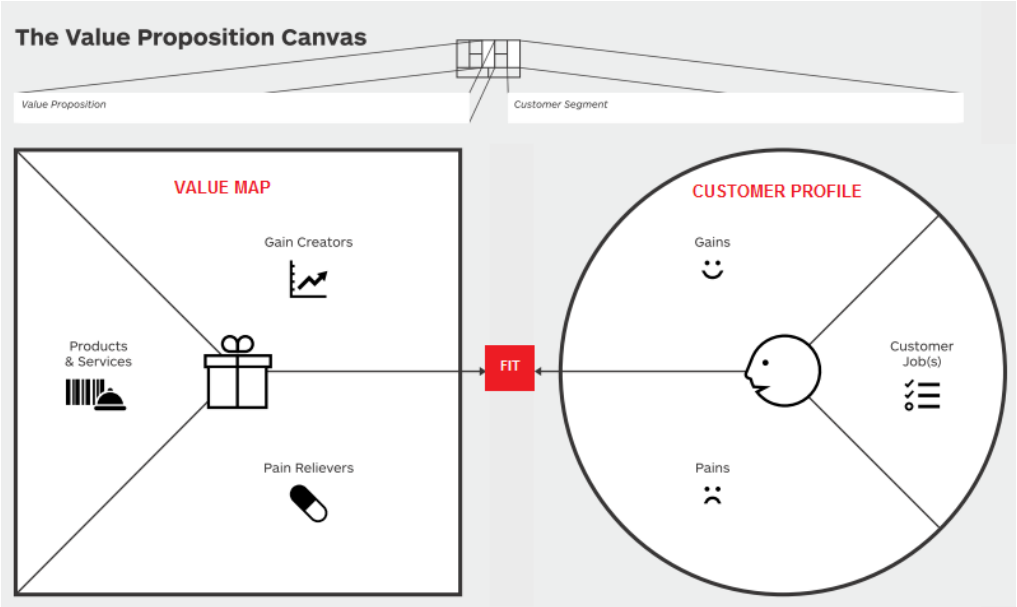

Figure 10. Adapted value proposition canvas (Osterwalder et al. 2014).

As can be seen in Figure 10, the customer profiling includes jobs, pain areas and gain areas of the customer. However, it is important to note that customer profiling has to be preceded by a selection of the applicable customer segment as the premise. In B2B context, there are several customer segments, each of which require different CVP approach. During customer profiling, customer perspective is the most critical input for value innovation. At this stage, possible '*earlyvangelists*' are identified as well, who are customers showing early interest in CVP innovation process and ready to take risks for testing new ideas. Next action in this stage is to create the value map in provider sphere for finding the relevant mix of products and services in the portfolio, which addresses customer needs and in turn addresses critical pain and gain areas with value enablers. This mix is obtained from core competence analysis of the provider. During both customer profiling and value mapping, it is important to rank the elements in order of priority.

Also as explained in sub-section 3.2, the driving force behind the value canvas need to be understood i.e. whether the market pull or technology push are triggering the need for CVP innovation. The final action in this stage is to evaluate the fit between customer profile and value map. For existing businesses, the high level implications on prevailing business model are also noted at this point.

The second stage of CVP innovation is design. The starting point is the value proposition canvas generated in first stage. The canvas is used first to gather ideas and insights from the stakeholders. The second aspect is to create prototypes of alternate CVPs. The prototypes are then evaluated with implications on business model and are also compared with competitor CVPs. For existing business, this evaluation is key to compare prototypes in the invent-improve spectrum described in sub-section 3.2. In following Figure 11, the strategy canvas framework for competitor evaluation is given. Once the prototypes are created and compared with dimensions of fit and competitive edge, then the most suitable alternative(s) need to be selected. Also the minimum key feature set in CVP, known as minimum viable product (MVP), is to be chosen for easy testing.

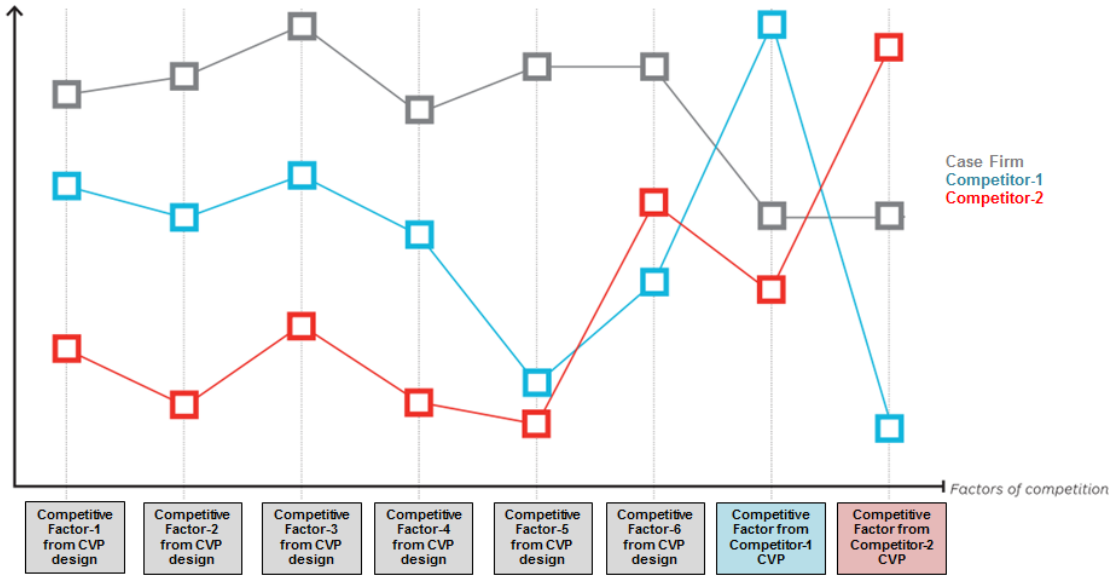

Figure 11. Adapted competitive strategy canvas (Osterwalder et al. 2014: 129).

The third stage of CVP innovation is testing the CVP. The testing process involves internal tests, customer validation with the selected prototypes and market validation with pilots. As the testing progresses from internal to market tests, the complexity and expenditure increase, but the certainty in CVP is improved. The testing involves the fit be-

tween value map and customer profile, fit with business model and capturing the learnings. The learnings are used in iterative fashion to improve the CVP, until the same is ready for implementation.

There is a set of key ten questions for evaluating the quality of CVP. The ten questions are concerning evaluation of underlying business model after CVP innovation; assessment of focus on key value enablers; assessment of value enablers from customer perspective; alignment with customer's method of measuring success; synchrony of value enablers with most important customer jobs, pain and gain areas; sensible differentiation from competition; assessment of focus on all relevant customer job classes; one key dimension to outperform competition; difficulty in replication by competitors; and focus on customer's value sources.

The fourth stage of CVP innovation is to evolve. In this stage, the innovated CVP is implemented with following elements: creating alignment across provider organization; measuring and monitoring business model and CVP performance through growth, profitability, market share, customer satisfaction etc.; and capturing the lessons learnt to improve and reinvent CVP continuously.

This concludes the discussion and analysis of existing knowledge in service oriented CVP innovation along with associated revenue model development. The coverage of these topics provide the necessary framework for the thesis work.

3.5 Conceptual Framework for Building CVP and Basic Revenue Logic

The research on existing knowledge in service oriented CVP innovation, theory and process of CVP innovation, as presented in above sub-sections of section-3, is done in the context of broader B2B business settings. The findings are utilized to create the conceptual framework for this study to build a new CVP and basic revenue logic associated with it. The framework is presented in Figure 12.

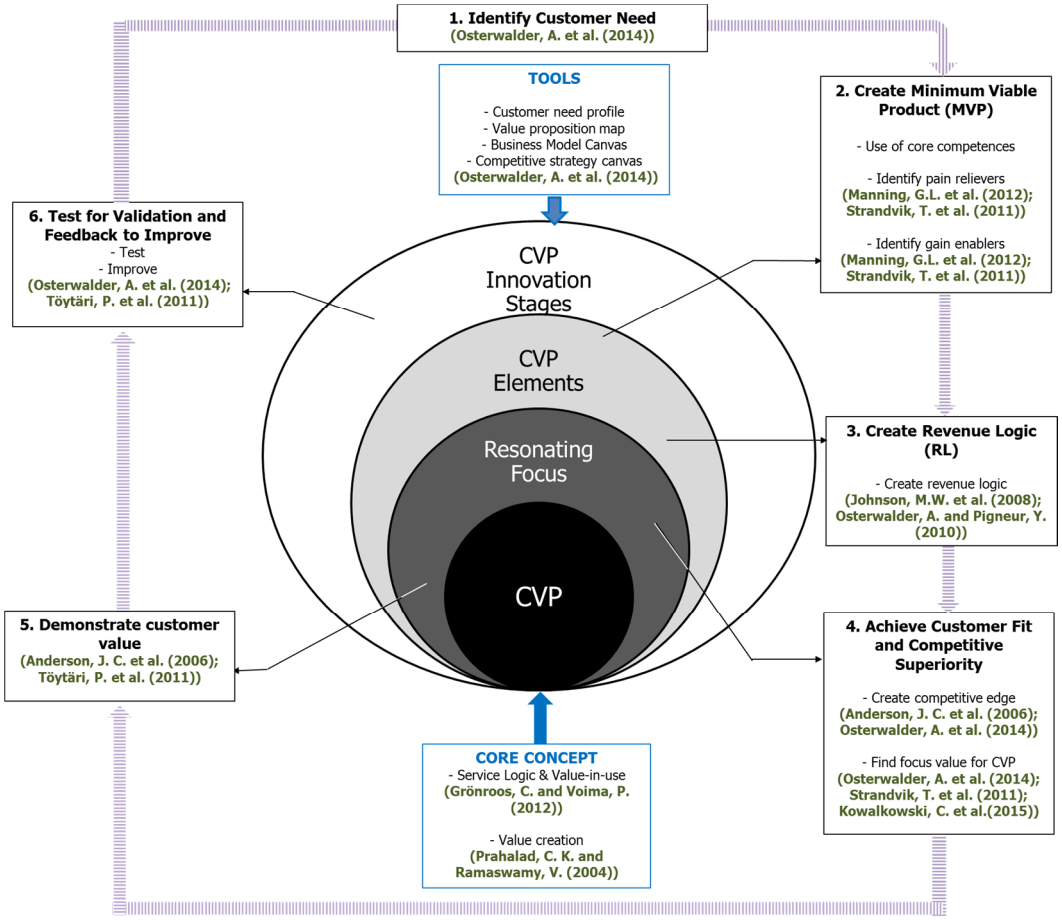

Figure 12. Conceptual framework of the study.

As the scope of the study does not include the detailed implications of CVP innovation on all the building blocks of business model, the framework is applicable only for CVP and basic revenue logic. The framework first provides inputs for analysis of case company's existing CVP and revenue logic (Section 4) and then creates the structure for new CVP design (Section 5), followed by subsequent validation (Section 6). As presented in Figure 12, the central onion model depicts layers of CVP innovation. The first model layers are to follow CVP innovation stages for finding the elements of new CVP. The next layer is then developing the differentiating focus in CVP to finally arrive at core layer or foundation of innovated CVP.

The process follows logical six step order of CVP innovation. In the first step, customer need profiling is made along with gathering feedback on existing CVP, by collecting primary data from internal and external stakeholders and secondary data from existing data and documents. In the second step, the core competencies of the case firm are recorded

and value enablers in existing CVP are searched for. The third and fourth steps for evaluating existing revenue logic and problem-solution fit of existing CVP are carried out. These actions take place in current state analysis phase (Section 4).

In the proposal build-up phase (Section 5), the second, third and fourth steps of CVP innovation are repeated with findings from current state analysis as input. The value mapping in this phase is done from service innovation perspective to identify key value enabling elements for the customer. Alternate CVP prototypes are created in this phase. The prototypes are used to create Minimum Viable Product (MVP) prototype for testing. Alternate revenue logic models for fitting in the MVP are conceptualized in this phase. The problem-solution fit of MVP is investigated against customer profile in value proposition canvas to find the focus value and corresponding value enabling elements. The competitor CVPs are compared in competitive strategy canvas with MVP to find the competitive edge.

The fifth step is to create platform for demonstrating customer value to customers, e.g. value calculator, in line with new MVP framework and alternate revenue logic models as part of the proposal build-up phase.

The sixth and final step of CVP innovation is executed in the validation phase (Section 6). Customer cases are selected for testing the MVP and alternate revenue models. The focus value for the customer and differentiating value enablers are identified for the customer case. Value-in-use for both the case firm and customer are estimated and compared with existing CVP. Subsequently initial risk comparison is made amongst the alternate revenue logic models for new CVP. The relevant questions from ten questions to assess CVP success are selected and used to assess the CVP. Feedback from internal stakeholders are captured in this step and initial customer feedback is obtained to confirm customer interest. All these information are then fed into the selected MVP for further refinement of the new CVP.

The above six logical steps are iterative and cyclical in nature for increasing certainty and confidence, but time and resource constraints in the current study force the CVP innovation process to stop after the first cycle. Thus the final CVP as the study output is obtained after one round of validation and modification.

The next section describes the findings of the current state analysis of the case firm's existing CVP.

4 Analysis of the Case Company's Existing CVP

This section describes the current state analysis of existing CVP and revenue logic in the case company's minerals processing plant projects business for the target customer segment. The analysis is done as per the research design and methodology outlined in Section 2, within the realm of the conceptual framework established in Section 3.

4.1 Overview of the Current State Analysis Stage

The current state analysis stage covers various factors and characteristics, which influence the performance and positioning of the case company's existing CVP and revenue logic (RL) in minerals processing plant projects business. These aspects also differ from one customer segment to another. As described in sub-section 1.3, the customer segment of "Junior & Start-up" has been selected as the premise of the study, as the companies in this segment do not yet have the substantial experience and maturity in the mining industry and henceforth require more support from the providers. The findings from the analysis are presented sequentially in the subsequent sub-sections for four key subject areas: evaluation of core competences (technology and sales management); identification of current market and industry drivers along with associated needs of target customer segment; evaluation of existing CVP and RL in the setting of service logic orientation to meet the identified drivers and needs; comparison with key competitors; and identification of strengths and weaknesses of the existing CVP and revenue logic.

For competitor analysis, two comparable peers of the case company are chosen, which for long have been established rivals to the case company in mining industry. They are referred to as Company X and Y from hereon to maintain internal confidentiality in the case firm. They are described in detail later in this section.

The current state analysis work used Data-1 as input, outlined in Section 2. Data-1 consists of two sets of primary data and one set of secondary data. The primary data sources were in the form of four external customer interviews and fourteen internal stakeholder interviews.

For external customer interviews, two customers from Junior & Start-up, one customer each from Major and Mid-tier customer segments were selected. Even though, the focus of the study is not on Major or Mid-tier segments, their views were captured as they represent established players in the mining industry with considerable history of project development, operations and thus could provide insights for future implicit needs of the

junior & start-up segment. The interviewees were chosen from the various levels of customer organizations, such as project management, operations, supply chain management and senior management, to cover the varying needs of different stakeholders.

For internal stakeholder interviews, individuals were selected from different functions who have customer touch-points such as CAPEX sales, sales operations, services sales, delivery, technology and finance. Most of the individuals have over decade long experience in mining industry or other closely related B2B industries.

The secondary data comprised of the internal data and documents of the case firm. In addition, industry reports, various customer documents and competitor documents for company X and Y have been utilized to draw insights. These are described in Data-1 of Section 2.

The logical reasoning for current state analysis is presented in Figure 13 below.

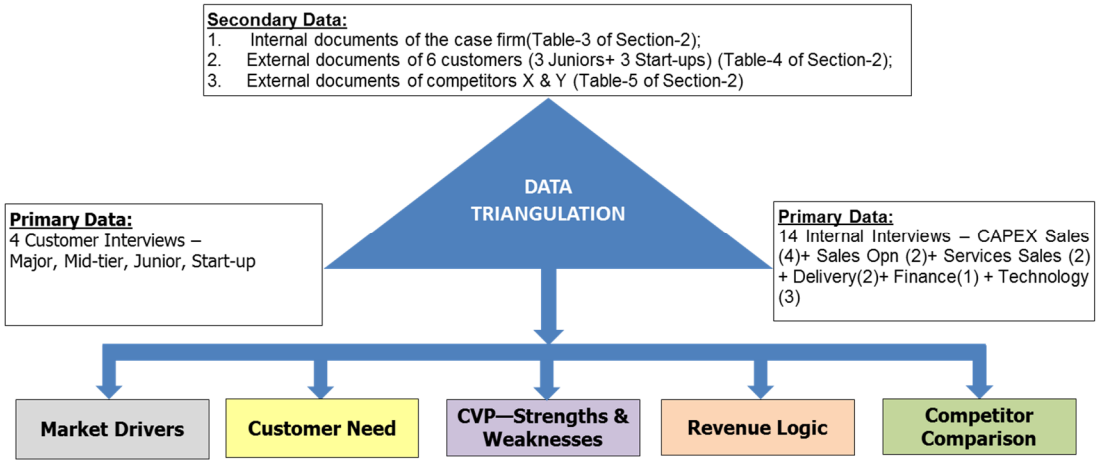

Figure 13. Data triangulation in current state analysis.

As described in Figure 13, the data from three sources are used to achieve data triangulation for the analysis of market drivers, customer need, strengths and weaknesses of CVP, existing revenue logic and competitor comparison. The tools outlined in sub-section 3.4 have been used in current state analysis.

In the next sub-section, the foundational block of case company's existing CVP is analyzed i.e. core competence.

4.2 Core Competences

The case firm has been proven to be a preferred technology supplier for numerous customers in mining and metallurgical industries, in both spatial and temporal dimensions. The case firm has historically provided solutions, spanning a broad spectrum of minerals

and metals. The success achieved by the case company in winning business and establishing brand reputation stems from core competences, which can be classified as technology competences and sales management competences.

4.2.1 Technology Competences

The core technology competences of technology and projects companies serving customers in mining and metallurgical industries emerge from four aspects, which are positioning in value chain of underlying entity (purity of valuable minerals/metals and their properties); capability in each stage of the value chain; proven products and solutions covering wide spectrum of minerals and metals; and developing new breakthrough technologies.

The value chain for extracting minerals and metals from ore deposits is shown in Figure 14 below (Data ID: 1D-d3). The case firm's positioning in the value chain is presented in the figure as well.

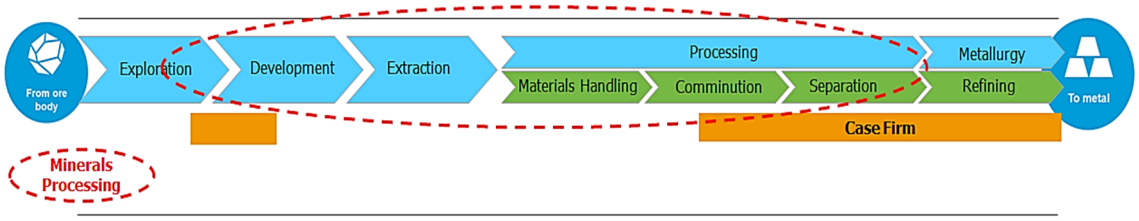

Figure 14. Value chain in mining and metallurgical industries.

Value enrichment from the native ore body to final product (high purity metals or other forms) is progressive through several phases and processes, as depicted in Figure 14. The project goes through first exploration and mine development stages, which are usually very long and resource intensive phases. The project feasibility is also investigated and concluded in these two stages. The value creation starts from mining extraction and then through several unit processes, the final product is obtained. The scope of minerals processing offerings is marked in Red dotted circle, which includes materials handling, comminution and mineral separation technologies. However, some minerals also require integration and inclusion of metallurgical technologies inside the minerals processing plants. The case firm is positioned to provide assistance in value extraction process from the early development stage to the final metal production through process technologies. However the case firm is not present in mine development, mine design and mining operations, including materials handling technologies.

The capability of the case firm in each stage of the value enrichment process as outlined above, is presented in Figure 15 (Data ID: 1D-d4).

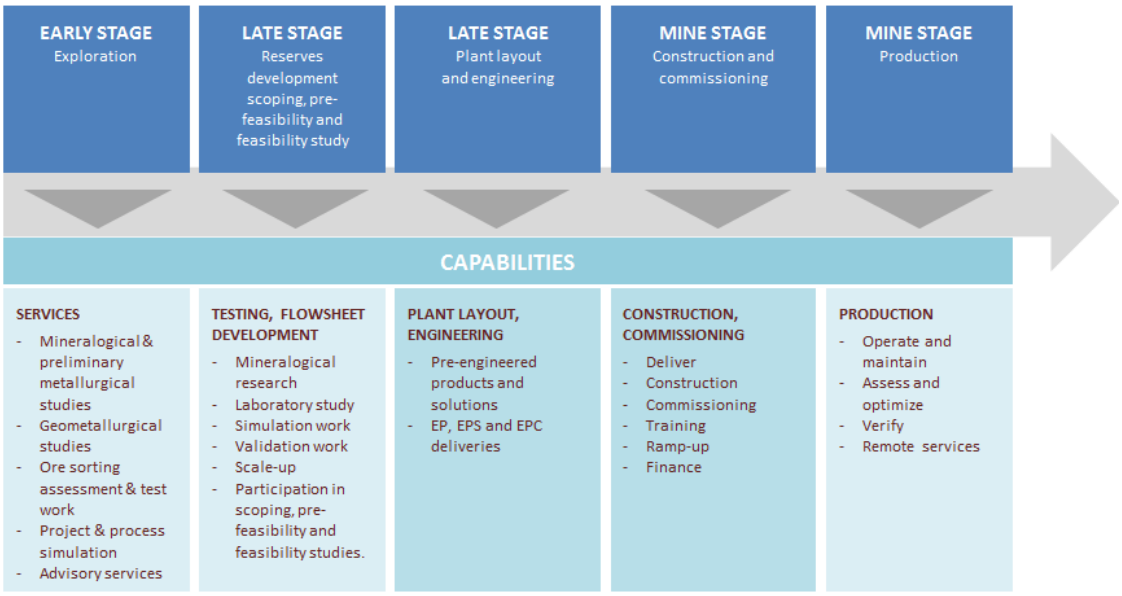

Figure 15. Capability of case firm in minerals processing plants.

From Figure 15, the case firm is capable of delivering a solution in each stage of the value enhancement process in the form of research and testwork, flowsheet development, feasibility studies, basic and detailed engineering, process equipment, complete plants, commissioning, ramp-up and assistance in operation, maintenance ,optimization of plant operations. Thereby, the case firm is capable of bringing in the perspective of production stage optimization in the early project development and design phases.

The case firm has provided products and solutions in all of the key metals and industrial minerals, which are consumed globally, such as copper, nickel, lead, zinc, iron, gold, silver, platinum group metals, molybdenum, lithium, cobalt, rock phosphate, fluorspar and so forth. Following Figure 16 (Data ID: 1D-d4 and d5) summarizes the products and services in the portfolio of the case firm, being offered for the minerals processing plants.

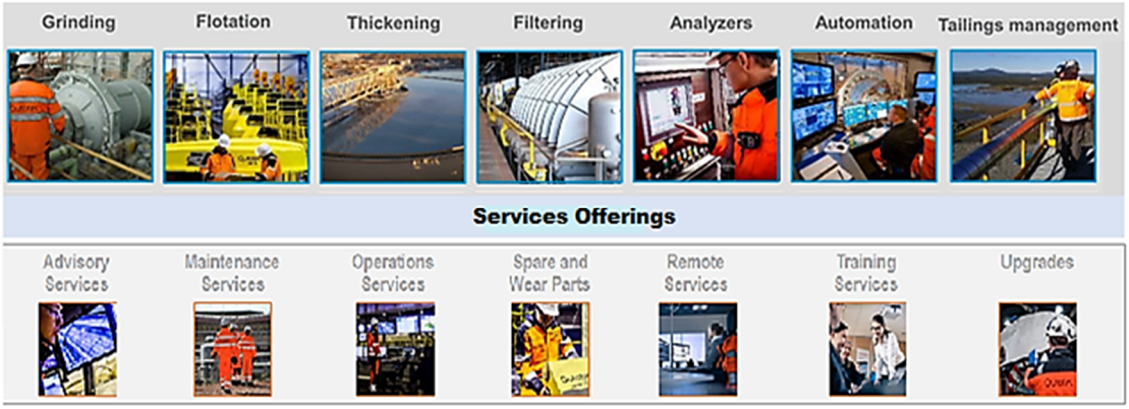

Figure 16. Products and services offerings of case firm for minerals processing plants.

As can be seen in Figure 16, the case firm has wide range of products to become part of CVP in minerals processing plants. The range of services offerings provide the necessary after-sales services. Also, the case firm has a large installed base for the products spread globally, many of which are part of complete concentrator plants built by the case firm. Thus the case firm has an impressive list of references for minerals processing plants.

The development and deployment of new technology solutions for minerals and metal processing are integral to the value of the case firm, which is *"sustainable use of earth's natural resources"* (Data ID: 1D-d3). Apart from innovations in process technologies, continuous upgrade and improvement in product quality, scale and features, the case firm has been a pioneer in developing advanced automation solutions for the industry. The case firm is presently also developing digitalization solution, which is presented in Figure 17 below (Data ID: 1D-d6, d8 and d9).

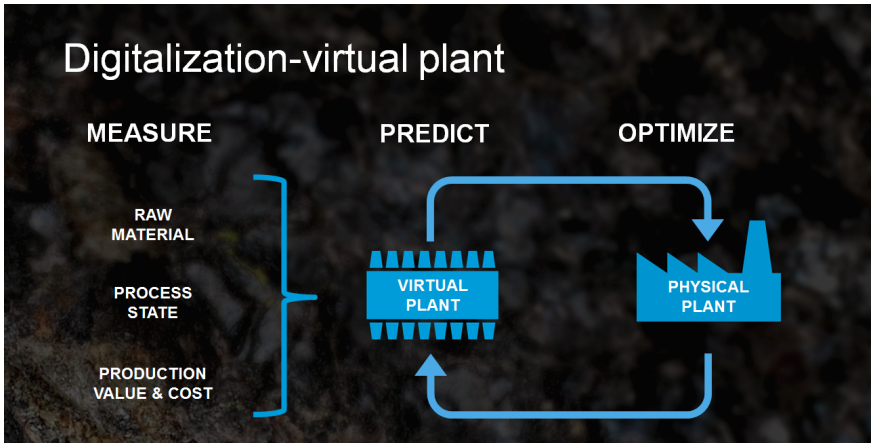

Figure 17. Plant digitalization concept from case firm.

The above figure presents the focus of the case firm in digitalization. Contrary to the market trends of equipment level Internet of Things (IoT) based piecemeal solutions, case firm is developing the plant level digitalization solution, integrated to another emerging development of geo-metallurgical advisory services. Thus again the case firm is having an emerging core competence, which is not readily available in the market.

4.2.2 Sales Management Competences

In addition to the core technology competences, a company also needs competences in sales management to compete in the market, win business, retain and satisfy customers, and grow volume and profitability. Thus the competences in sales management are rooted in effective internal sales processes, delivery processes, customer relationship management (CRM), easily accessible sales channels and strength of sales resources.

The first core competence of the case firm in sales management of minerals processing plants project business is the strength of sales team. Two principle resources are the main touch-points to the customers in each of the plant solution cases. One is usually located in local Market Area (MA) as the Customer Lead, where customer is operating and is responsible for close customer contact. The other resource is Solution Lead, who is responsible for bringing customer centricity in the solution development and to provide unique CVP to customers. The team is supported by plant solution technology team, research centers, plant engineering and delivery team, solution proposal management team, individual product lines and services business unit. The team of solution leads comprise of people with long experience in mining industry and case firm, thus having the holistic view of customer's value chain as well as case firm's capabilities. Being in the industry for long, the team of solution leads is trusted by all established customers.

The case firm has continued to develop the sales management process, which is closely linked to customer's process, bringing in outside-in view and also linked to internal delivery management process, which contributes in inside-out view. Case firm's CRM system is also built-in the sales management, even though it is yet to reach the mature stage like other leaders in B2B industry. Fundamentally, the case firm's sales process is divided in five phases. The sales phases are: 1) understanding the customer's business and identifying the sales case; 2) developing the CVP and influence customer's needs; 3) proposing solution for the customer case; 4) discussion with customer to revise the proposal and winning the case; 5) delivering the solution and securing the value for customer and case firm. CVP identification and formulation needs to take place in Phases 2 and 3. Regarding the sales channels, the case firm has wide global presence physically, in addition to the active presence through its website and other social media platforms. In following Figure 18, the global presence of the case firm is presented (Data ID: 1D-d3).

Figure 18. Global presence of case firm.

As presented in Figure 18, the case firm has R&D, sales and service centers in 34 countries, covering presence in all six of human inhabited continents. The global presence enables the case firm to be in close contact with customers. However, the case firm is presently working through its new Services BU to establish global life-cycle service centers through the existing channels and the same is in deployment phase.

Summary of the case firm's core competences from the above analysis is presented in Table 13.

Table 13. Summary of core competences of case firm.

	TECHNOLOGY	SALES MANAGEMENT
Existing Competences	• Technology innovation, R&D with focus on sustainable technology solutions; • Process engineering, plant automation know-how; • Experience and know-how of mining operations • Design and manufacturing know-how for equipment; • Long experience of delivering large projects and learnings; • Large global installed base; • Superior quality of products , meeting or exceeding existing standards globally	• Strong and experienced plant solution sales team; • Structured and integrated sales processes; • Global presence and proximity to customers
Emerging Competences	• Digital Solutions ; • Know-how in Geo-metallurgy;	• Global presence for lifecycle services; • CRM system and tools

Thus from Table 13, it can be concluded that major core competences of the case firm are built around its new technology innovation capability and customers' trust on the same and case firm's resources. It is visible through consistent and large reference installed base of existing products and technologies, which have been developed over several past decades continuously.

In the next sub-section, the current state of two CVP elements are discussed, which are market drivers and customer need.

4.3 Identification of Market Drivers and Customer Need

Two critical starting elements for CVP formulation are understanding the market drivers and then identifying real needs of customers. Understanding drivers in the market and industry creates realization of market pull and technology push, which influences the

prioritization of customer needs and also the offerings available in market for the customers. Identification of true customer needs is required for selecting correct solution elements in CVP, so that problem-solution and customer-solution fits can be achieved and then differentiating value enablers can be found.

4.3.1 Market and Industry Drivers

Technology disruptions, volatility in commodity prices and several sustainability issues are driving changes in the present day mining industry. There has been a growing impetus on the future drivers in mining industry, led by technology innovations and disruptions in contextual industries as well as in other fields. This is now visible in several recent publications by independent research agencies, forums and consulting houses (Durrant-Whyte et al. 2015; World Economic Forum 2017; Deloitte 2018). Even though some of the discussions are partially biased to drive the audience towards services offered by the consulting houses, the key findings are common and several case studies in these reports support the conclusions drawn. Also the thematic and content analysis of primary data agree with most of the trends reported in the secondary data sources.

The market and industry drivers can be of two types, market pull directly impacting the customer need in mining industry and technology push from providers with new solutions for explicit and implicit customer needs, Table 14 summarizes the views of different customer segments and internal stakeholders of the case firm for market pull and technology push.

Table 14. Primary data analysis for market and industry drivers.

DIMENSION	CUSTOMER SEGMENTS			INTERNAL STAKEHOLDERS
	MAJOR	MID-TIER	JUNIOR & START-UP	
Market Pull	- Resource availability and accessibility; -Stricter environmental norms ;	- Declining head grade and resources; - Water availability and management; - Power consumption and energy price; - Economic mine to mill approach	-Increasing urbanization driving growth in metal needs; - Low commodity prices, reducing grade and resources requiring cost effective, efficient, environment friendly operations.; -Water availability and management; - Difficult environmental permitting	- Declining resource reserves, more complex ore; - Chinese investment in global markets; - Growth of middle class in China, India; - Sustainability and Environmental issues; - EPC model becoming popular; - Globalization; - Water scarcity and rights to use and discharge; - Remote location of ore deposits; - Growing political turbulence and nationalism; - Carbon footprint; - Availability of Organizational resources

DIMENSION	CUSTOMER SEGMENTS			INTERNAL STAKEHOLDERS
	MAJOR	MID-TIER	JUNIOR & START-UP	
Technology Push	- Precision mining ; - Remote technologies without human presence; - Dry comminution; - Coarse particle flotation	- Digitalization with smart sensors, simulation, data analytics; - New raw materials for battery	- Electric cars, creating demand for new minerals; - Robotics and digitalization	- Electric cars need new raw materials; - Pre-concentration; - Digitalization; - Dry concentration process; - Ultrafine grinding to improve recoveries; - 3D-Printing; - Coarse flotation; - Modelling capability; - Plant modularization

From the primary data summary and various secondary data sources, the key common market pull drivers are difficulty in availability, accessibility, quantity and quality of ore deposit resources; sustainability issues in availability and usage of water, energy; waste management and associated environmental permitting; and growing uncertainty and cyclicity in commodity market. The key technology push are coming from digitalization; requirement of new raw materials for electric vehicles; and technologies to use minimum or no water and less energy in minerals processing plants.

The first key market pull driver is the quick depletion of mineral resources globally and insufficient replacement of the same through discovery of new assets in all the aspects of quantity, quality and accessibility. This is driving the existing mining companies towards increased productivity and resource utilization efficiencies for maintaining profitability. The trend also means the new deposits are more complex, have much lower metal grades and mostly located in very remote and difficult climatic conditions, requiring very high volume operations and complex flowsheet to make projects viable. The implications have increased project cost and risks for both the existing and start-up mining companies. From a technology provider perspective, such as the case firm, the driver increases potential to tap into value-in-use by providing support in plant operations.

The second key market pull driver is the range of sustainability issues originating from lack of water availability and usage permissions, increasing cost of energy and associated high carbon footprint in mining industry, tailings (waste) management, stricter environmental norms and permitting processes. From the provider perspective, the driver creates new opportunity if the technology solutions already exist in the portfolio to address these issues.

The third key market pull is arising out of increased uncertainty in social-politico-economic environment globally and high volatility in commodity market. Mining and metals

industries have always been cyclic in nature, but these factors have made the cycles shorter and requires advanced level of adaptability and flexibility in operations to succeed. The cyclicity and volatility have impacted the customers as they suffered losses and had to write-off high CAPEX projects, thereby making them extremely cautious and conservative in making investment decisions. From the case firm's perspective, the phenomena has caused loss in business, cancellation of projects and ongoing contracts and substantial loss of skilled resources through several lay-offs for protecting profitability.

The first key trend for technology push in the mining industry is digitalization to address the issues of increasing productivity, increasing safety, cost reduction, coping with difficult and variable resource quality, and predicting future business performance accurately (Deloitte 2018). The potential impact of digitalization in mining industry is projected through different metrics, such as 10-20% productivity improvement (Deloitte 2018), cumulative value impact of approximately 190 billion USD up to 2025 (World Economic Forum 2017) and so forth.

Even though the current focus is on optimizing the cost and labor intensive blocks of operations (such as mining exploration and operation, supply chain and logistics and corporate functions like finance and accounts) to capture the low hanging fruits, eventually the focus would shift to the plant infrastructure for 'Digital Plant', the working area of technology and projects companies. This would open up new opportunities in value-in-use for the case firm.

The second major driver in technology push is the technology disruptions in other socio-economic domains, creating the need for new commodities for future. Rapid growth of electric cars, new energy storage systems are creating exponential demand for lithium, graphite and cobalt. This is attracting new players in mining industry, either entrepreneurs or established companies from other industries. This new breed of customers, mostly start-ups, require maximum support in establishing operations and thus making co-creation of value-in-use as an attractive value proposition element. (Deloitte 2018)

The third key technology push aspect originates from the need to reduce the water and energy consumption in minerals processing plants to minimum. Several companies, research agencies, universities and the case firm are striving to develop new technologies in dry concentration process to reduce water and energy, coarse particle flotation to reduce energy and so on. However, there is yet to be commercially viable technology available in the market in this area. (Data ID: 1D-d6)

In the next sub-section, the customer needs for the target customer segment are discussed.

4.3.2 Customer Need

In the setting of market and industry drivers discussed in previous sub-section, the customer needs are also evolving across all segments. In this study, the premise is the CVP innovation of the case firm in minerals processing plants project business for "junior & start-up" customer segment. Customer needs in this segment were first analyzed through secondary data analysis by reviewing company documentation of three junior and three start-up mining companies, available in public domain (Data ID: 1D-d12-17). With the background of this analysis, primary data was used to find the true customer needs of this segment in concentrator plants, in both project and operation phase.

In the following Table 15, the customer needs identified for target customer segment through secondary data analysis are presented.

Table 15. Customer needs in Junior & Start-up segment from secondary data analysis.

S.No.	Company Code	Category	GEOGRAPHICAL COVERAGE	COMMODITIES	CUSTOMER NEED FROM STRATEGIC OBJECTIVES
1	C-I	Junior	Americas, Australasia, SE Asia	Gold, Silver, Copper	Cost reduction, organic growth of production through debottlenecking and ramp-up, development of new assets, extension of existing mine-life, maintain strong margin, strong focus on return on invested capital (ROIC)
2	C-II	Junior	SE Europe, Turkey, Canada, Brazil	Gold, Silver, Lead, Zinc, Copper	Extension of mine-life, Low cost operation, organic growth, build strong operation team and capability, highest safety and environmental standards, focus on ROIC, development of new assets
3	C-III	Junior	Kazakhstan, Kyrgyzstan	Copper, Zinc, Gold, Silver	Production ramp-up, priority on health and safety,
4	C-IV	Start-up	Finland	Lithium	Licensing and permitting, Financing
5	C-V	Start-up	North America	Copper	Margin over tonnes focus for grade engineering, staged expansions, refinancing to reduce debt cost
6	C-VI	Start-up	Turkey	Gold, Silver, Lead, Zinc, Copper	Low CAPEX, Financing

From the above table, the identified key customer needs are CAPEX and operating cost reduction, financing, production ramp-up, licensing and permitting, focus on return on invested capital (ROIC), organic growth through staged expansion, extension of mine-life and priority on health and safety.

For primary data collection, interviewees were asked about the three aspects of customer need: key jobs the customers need to perform in the project and operation stage of concentrator plants, key gains the customers expect to achieve and key pains the customers are unhappy about.

Figure 19 below represents the findings from primary data analysis as customer need profile for junior & start-up segment, using the value proposition canvas tool. The elements in **BLUE** are the inputs received from major and mid-tier customer segments, which are relevant implicit needs for junior & start-up customers.

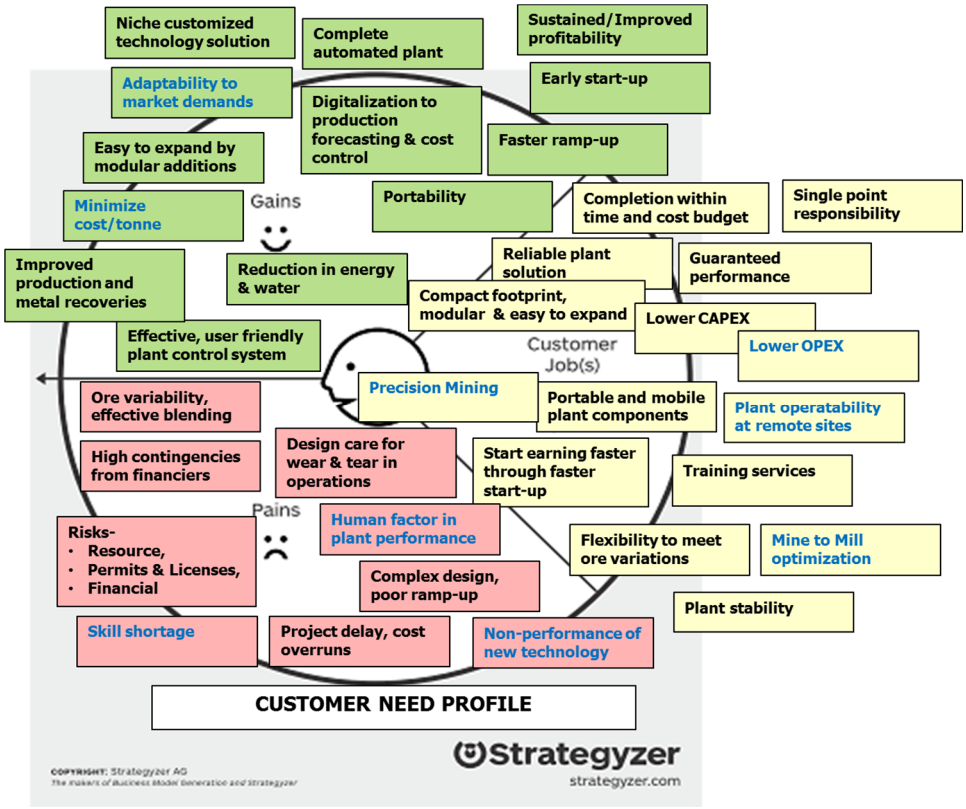

Figure 19. Customer need profile for 'Junior & Start-up' segment.

In the above customer need profile, there are 37 need elements, out of which there are 15 key jobs linked to 9 pain elements and 13 gain elements. Different key jobs may have common gain and pain elements associated with them. The findings confirm most of the needs identified through secondary data analysis and further provide additional need elements.

The first set of key customer jobs for junior & start-up segment are related to the delay in project and cost overrun, initially in project development phase for completion within committed time-schedule and budgeted cost and then in subsequent plant commissioning and faster ramp-up of production to nameplate capacity. The analysis shows there are 5 key customer jobs (completion within time and cost budget, single point responsibility, training services, plant stability and start earning faster through faster ramp-up) under this set, which lead to 3 pain elements (risks, project delay and cost overruns,

complex design leading to poor ramp-up) and 2 gain elements (early start-up and faster ramp-up).

The second set of customer jobs are related to the credibility of technology solutions responsible for plant performance, visible through 5 key jobs (guaranteed performance, reliable plant solution, single point responsibility, plant stability and flexibility meet ore variations). These jobs are associated with 4 pain elements (non-performance of new technology, complex design leading to poor ramp-up, design care for operational wear and tear, and risks) and 4 gain elements (niche customized technology solution, improved production and metal recoveries, reduction in energy and water, and sustained/improved profitability).

The third set of customer jobs are related to project's financials and financing aspects. There are 4 customer jobs related with it (lower CAPEX, lower OPEX, project completion within time and cost budget, and start earning faster through faster commissioning), which are linked to 3 pain elements (high contingencies from financiers, project delay and cost overruns , and risks) and 2 gain elements (sustained/improved profitability and minimize cost/tonne).

The first and second set of jobs, pain and gain elements have major contribution in outcome of third set of jobs, by enabling associated gains and removing pains. This aspect was clearly spelt out by one of the interviewees in customer interviews.

> *"Because of very bad track record, financiers are telling us to have very high contingencies from this bad reputation perspective for the mining industry. If you look at the mining projects in last 10 years, almost all of them had cost and schedule overruns, even though there are exceptions. Financiers have a serious concern on cost overruns. Technology assurance/guarantees from reputed technology suppliers like yours' off course has a role to play to increase their confidence, but in most of the cases, they have very high contingencies for mining industry projects."*
>
> *Data 1: Interviewee 18, CEO (Data ID: 1D-c4)*

The fourth set of customer jobs are related to complexity, variation, access and depletion of ore resources, requiring adaptable and smart plants leading to high productivity. There are 6 customer jobs related with it (flexibility to meet ore variations, plant stability, reliable plant solution, mine to mill optimization, precision mining, and plant operatability at remote sites), which are linked to 5 pain elements (non-performance of new technology, effective blending for ore variability, human factor in plant performance, skill shortage,

and risks) and 5 gain elements (complete automated plant, effective and user friendly plant control system, digitalization to production forecasting and cost control, adaptability to market demands, and improved production and metal recoveries). It is to be noted, that some of the elements represent mature view, which are obtained from majors and mid-tiers. The aspect, commented on by the interviewee from major customer segment is as follows:

> *"The interesting point is the present way concentrator plant is operated and dependent on human operators' performance. Also process variation needs process adjustments, which should be automatic and without operators' interventions. There are already many variations in the process, including ore variations. We need to avoid additional factor of humane variations to avoid bad results."*
>
> *Data 1: Interviewee 17, Global Supply Manager-Innovations (Data ID: 1D-c3)*

The fifth set of jobs are related to the future organic growth plan of customers through plant expansions. There are 2 key associated customer jobs (portable and modular plant components, and compact plant footprint, which is easy to expand) and 2 gains (portability and easy to expand by modular additions).

The identified needs of junior & start-up customer segment, as described above, also are influencing customers' decisions on investments and the type of purchasing models. The analysis of primary data obtained from internal interviews in the case firm shows that the juniors and start-ups have been finding more obstacles to secure financing and favorable financing terms. This has increased huge pressure on customers to reduce CAPEX to make the projects viable, henceforth leading to price war in the market. In addition to that, complexity, variability of low grade deposits, some of which are also in remote locations, have created a trend in customers to go for the EPC or turnkey model for their projects.

In the next sub-section, the existing CVP and RL of the case firm are discussed.

4.4 Existing CVP and Basic Revenue Logic

The next core element is value mapping to meet the customer needs and then finding the problem-solution fit. The other core element is the revenue logic to deliver the CVP.

4.4.1 Existing CVP Mapping and Problem-Solution Fit

The existing CVP of the case firm for minerals processing plant projects consists of several components in various stages of the project. The components form the sales mix as proposition to the customers and the mix varies from individual customer to customer, as well as from project phase to phase for the same customer. However, the sales mix does not consider customer segmentation as a differentiation driver for varying the sales mix. Often, sales mix does not consider the true needs of the customer and tries to fit similar sales mix for all customers.

In the project development phase, CVP usually includes R&D services for testwork, flowsheet development and participation in feasibility studies. In the project execution phase, the case firm can take up various scopes like engineering services (basic and/or detailed), supply of proprietary equipment and automation solution, supply of additional third party equipment, supervision of equipment installation and commissioning, supervision of overall plant installation and commissioning, plant construction in alternate delivery models, such as EP (Engineering-Procurement), EPS (Enginnering-Procurement-Supervision) or turnkey EPC (Engineering-Procurement-Construction). However, EPS has been the preferred delivery model of the case firm.

In the operation phase, the case firm provides production ramp-up support, training services, operation and maintenance advisory, plant upgrade and modernization, remote advisor services and spares through it's separate Services business unit as separate offerings. Some of the services components like commissioning and insurance spares, training services are also included in the CAPEX scope. However, the CAPEX offerings and services offerings are not integrated as such and thus the case firm commonly faces several rounds of competition from different competitors during different project phases.

The core of the existing CVP thus lies in technologies and application of the same in different project phases. As one of the internal interviewees put it forward:

> *"It's our knowhow in technology and plant engineering matters including process route optimization, equipment selection and right level of automation. These have impact on plant productivity and availability. Also we focus on reducing plant footprint and reducing energy consumption, so that it has a positive impact on CAPEX, OPEX and carbon footprint. Thus usual model is EPS. The next step is the client support in form of commissioning support, spares and process optimization. I think we can cover the plant operations,*

except the blue collar resource matters. Continuous support to client operations is something we need to develop more. But it also depends on how the client is capable to run on own strengths. "

Data 1: Interviewee 2, Director-Plant Metallurgy (Data ID: 1D-p2)

Figure 20 below presents the value map for evaluating existing CVP of the case firm and further presents the customer need profile along with the value map on Value Proposition Canvas in Figure 21. Likewise in customer need profile, the value map also consists of three elements: sales mix comprising of products and services, gain creators and pain relievers addressing the gain and pain elements in the customer need profile.

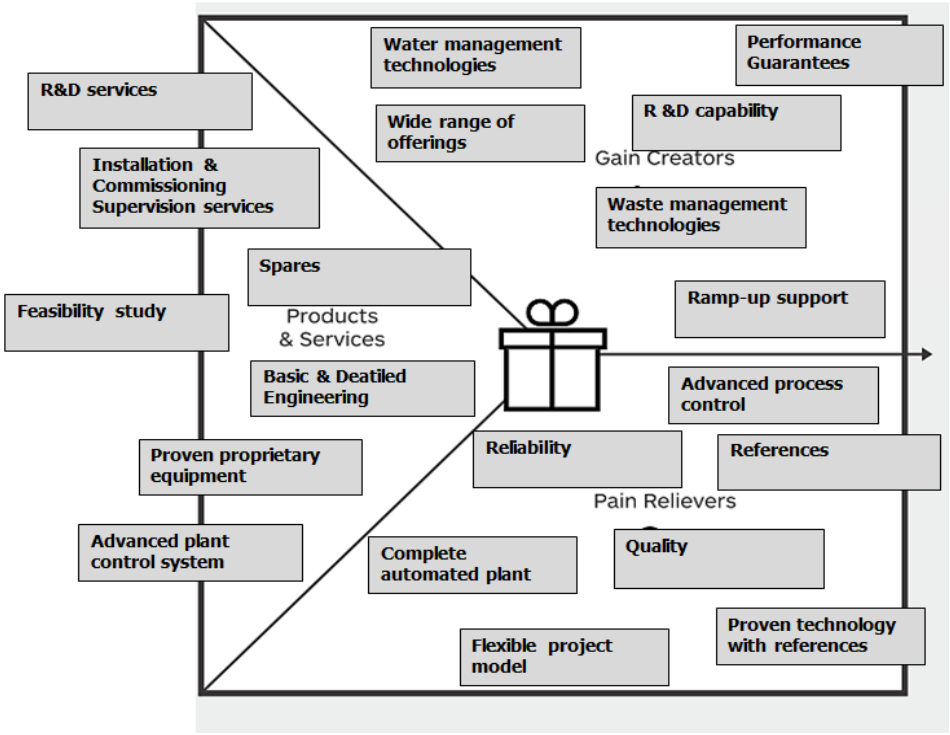

Figure 20. Value map of existing CVP of case firm.

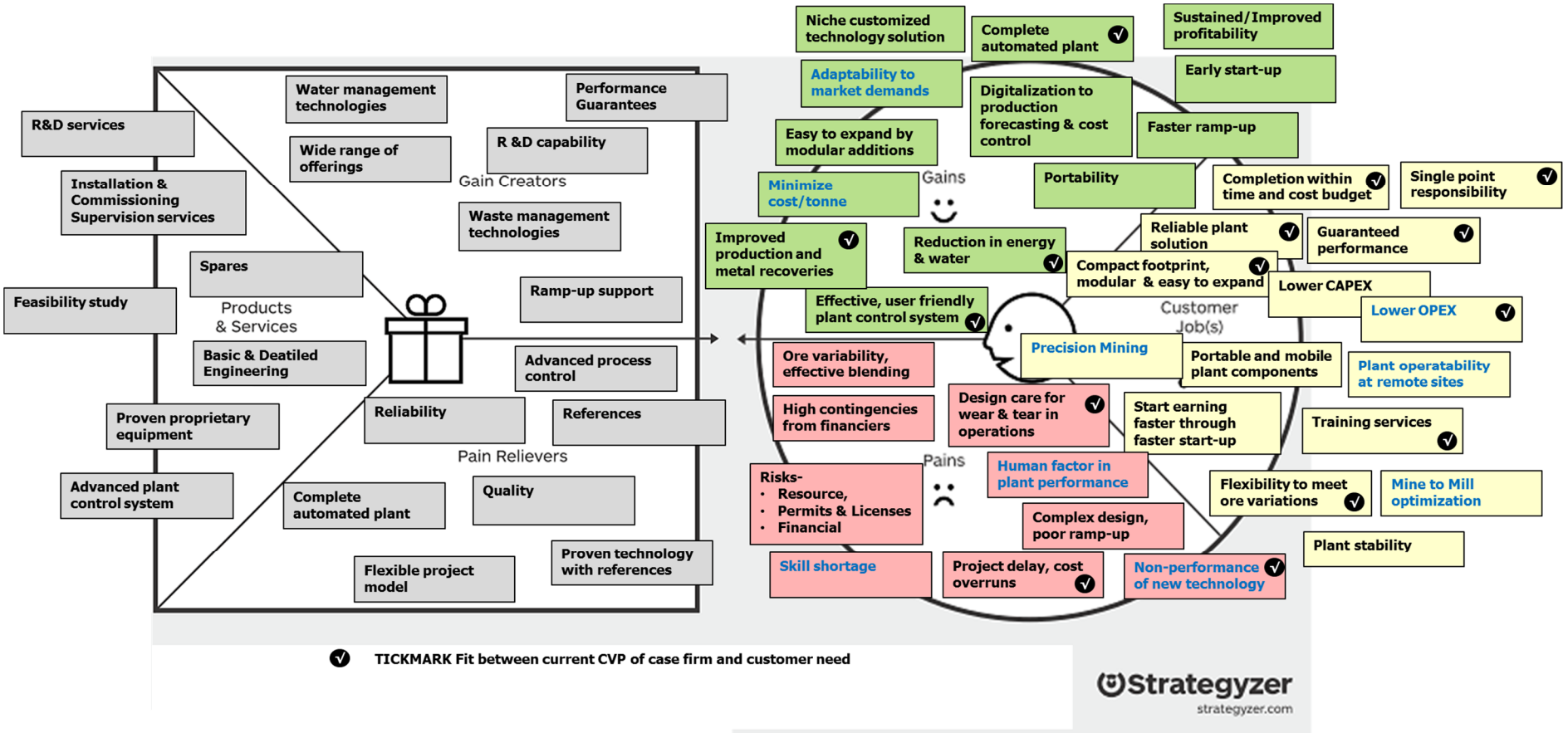

Figure 21. Problem-solution fit for ‘Junior & Start-up’ segment.

Figure 21 also highlights the problem-solution fit of the case firm’s existing CVP to the customer needs identified in previous sub-section 4.3 with tickmarks. The analysis shows that case firm’s existing CVP is partially meeting the first set of customer’s job, pains and gains to execute projects within budgeted cost and schedule in the construction phase, but is not fulfilling the need elements in post start-up phase. The existing CVP is

mostly serving the plant performance need based jobs, pains and gains in the project development and execution phase, but is absent in the issues in post-commissioning plant operation phase. For third set of customer jobs, pains and gains related to customer's financing issues, the existing CVP is partially meeting the jobs and pains but not meeting any of the expected gains. The fourth set of customer jobs, pains and gains are connected to the need of having flexible, adaptable and smart concentrator plant for handling complex, variable ore types and increasing productivity to maximize efficiency of utilizing mined ore resources. The existing CVP meets these customer jobs, gains and pains partially. The fifth set of identified customer jobs are related to the vision of organic growth through modular and easily expandable plant expansions. The existing CVP meets the customer jobs for basic requirement, but fails to address the expected gains.

The prevailing success factors of the case firm are strength in technology development and delivering promised performance, prominent in the existing CVP and well acknowledged in the market.

> *"Your company is the pioneer of the mining sector in terms of introducing latest technologies as a result of onerous Research and Development studies."*
>
> *Data 1: Interviewee 15, Process Director (Data ID: 1D-c1)*

> *"Company value is 'We deliver what we promise'. We really have tried to ensure this as a legacy and customers appreciate this. This is true for all our technologies."*
>
> *Data 1: Interviewee 5, Director-Solution Sales (Data ID: 1D-p5)*

The existing CVP of the case firm for minerals processing plant projects serves all the customer job sets partially and meets several need and pain elements in the project development and execution phases, creating substantial value potential for customers. However, the existing CVP is not fully equipped to include the solution to customer's continuing needs in the operation phase, the value-in-use. The required offerings exist in the portfolio of Services BU, but lack of integration in solution offerings does not make the benefits visible.

Henceforth, the case firm's existing CVP is very much rooted in goods logic, not creating opportunity to tap into customer's value-in-use.

In the next sub-section, the case firm's existing revenue logic related to the existing CVP is discussed.

4.4.2 Existing Revenue Logic (RL)

The existing revenue logic (RL) of the case firm for associated CVP in minerals processing plant projects is presented in Figure 22.

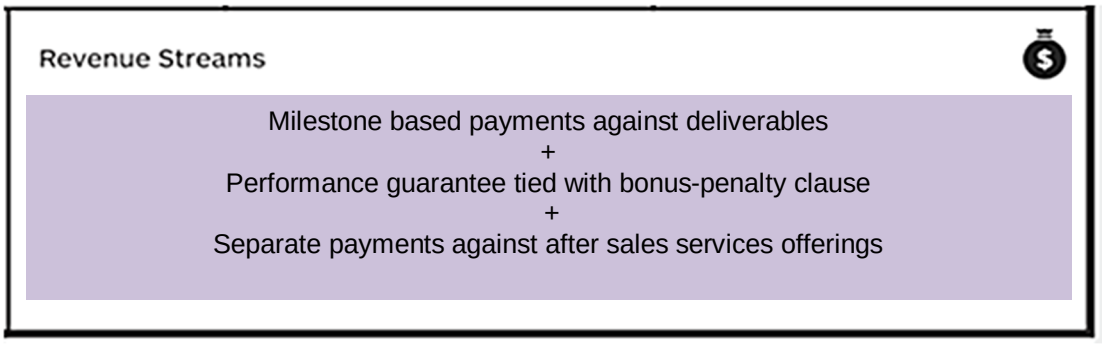

Figure 22. Existing revenue logic of case firm in concentrator plants project.

To elaborate on the above figure, the RL in the plant's project phase is principally transactional and payment terms are linked to various milestones in delivery process, as agreed during sales stage. The contracts are agreed upon between the customer and the case firm for a fixed price and delivery time, for all the goods and services included in the case firm's scope. A certain portion of the payment is held back by customers, either as actual due payments or in the form of promissory notes, such as bank guarantees. This is for the penalty elements in the situation of sub-par performance by the case firm. The performance in this business is usually defined by timely delivery or project completion and metallurgical performance of technologies. The metallurgical performance of the delivered plant solution is demonstrated by the case firm for a short period of time (days or weeks), as agreed mutually with customer. After successful completion of the project and demonstration of technology performance during the test period, the case firm does not have any other specific liability to customer in the project, except mechanical warranties for the supplied equipment.

The RL for separate services offerings are also mostly transactional with fixed price tags, such as spares, upgrade and modernization. Only few services are sold in regular fee model, like operation and maintenance advisory, remote services etc. As in CVP, RL in services offerings are also delinked with RL in plants projects.

Thus the focus of existing revenue logic of the case firm in minerals processing plant projects is to secure transactional deal with good profitability and limited time-bound liability. This is simply put by one of the interviewees as:

> *"Earning logic is still one time maximum gross margin, which is not clever."*
>
> *Data 1: Interviewee 5, Director-Solution Sales (Data ID: 1D-p5)*

The lack of integration of services offerings into upfront CAPEX deal revenue logic forces the case-firm to enter the competition twice for the same project, once in project development, execution phases and then again in operational phase. Thus, the non-cyclic revenue streams arising out of participation in customers' value-in-use remain untapped greatly.

In the next sub-section, the existing CVP and revenue logic of case firm are compared with two established competitors.

4.5 Existing CVP and Revenue Logic of Competitors

There are several competitors of the case firm in mining industry. One group of competitors are individual equipment suppliers, addressing only part of process flowsheet in minerals processing plants. The second group of competitors consist of engineering companies, who take on the entire project management role on customer's behalf and the scope is known as EPCM (Engineering-Procurement-Construction management). The third group of competitors are construction companies, who take up the project on turnkey or EPC basis and then sources technologies and equipment from various companies, working as sub-vendors to them. The second and third group of competitors are also customers for equipment and services to the case firm. The fourth group of competitors are local services companies, who compete with the Services BU for the spares in the operational phase of the project. The fifth group of competitors are research laboratories, engineering consulting houses, universities and ICT (information, communication technology) companies offering services in the project development and operation phases.

However, it is the sixth group of competitors, who can be considered truly peers to the case firm and are capable to provide similar holistic solutions like the case firm. These companies are few in numbers and for this study, two such companies are chosen for comparison. These two companies are Company X and Company Y, both having headquarters in Scandinavian Europe like the case firm. In following Figure 23, the comparative positioning of the case firm vis-à-vis the competitors X and Y in the mining value chain is presented.

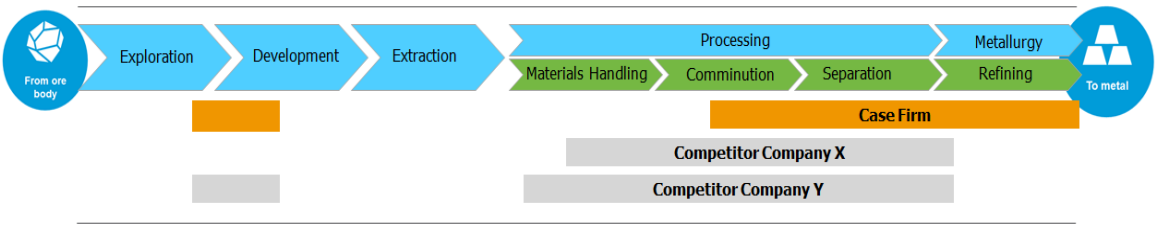

Figure 23. Comparative positioning of competitors in value chain.

As can be seen in Figure 23, both the companies X and Y have an edge over the case firm in the upstream part of the minerals processing in extraction stage, as they have technology solutions for materials handling and initial part of comminution unit processes. However, the case company has significant edge over the competition by having the technology range covering the complete downstream metallurgical processes up to finished metals or products, ready for consumption. In the project development stage, company X does not have any significant coverage. Even though company Y is present in the early project development stage, but lacks strong enough R&D capability compared to the case firm.

However, from the service logic orientation perspective, Company X is at more mature stage than Company Y and the case firm and has already established significant non-cyclic services business portfolio. Figures 24 and 25 below represent comparative business performance of case firm, company X and company Y with respect to the growth of services business (Data ID: 1D-d20 and 23).

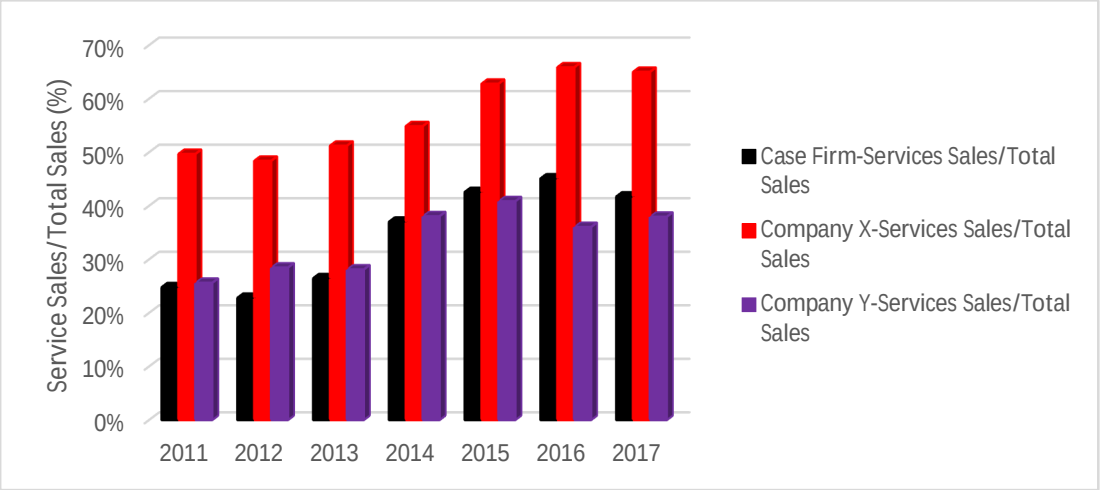

Figure 24. Contribution of services sales to total sales.

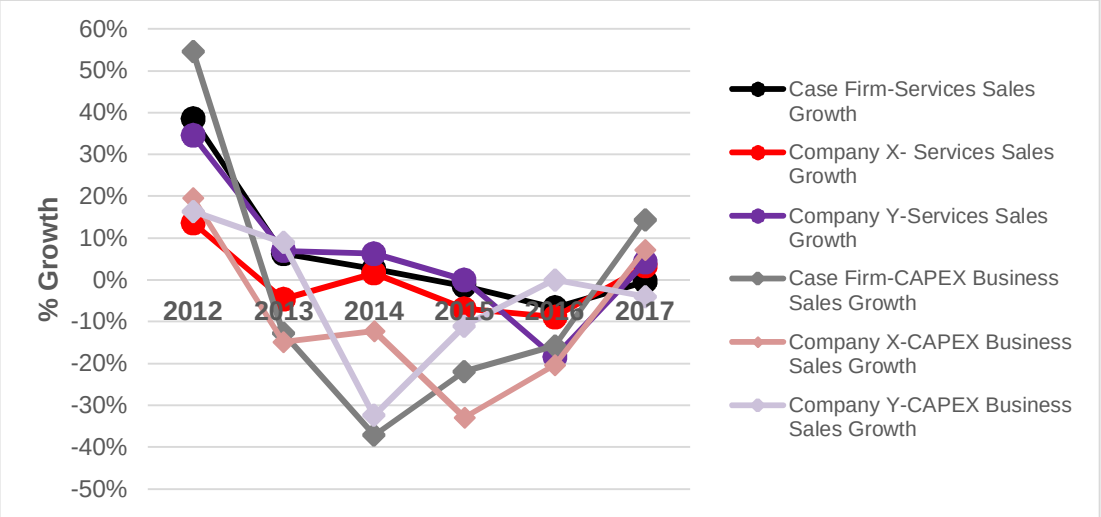

Figure 25. Business growth comparison--services sales vs. CAPEX sales.

In the above figures, it is clearly visible that company X has been the leader in services sales driven business model, when compared to the case firm and company Y.

Table 16 below summarizes the findings of secondary data analysis for the current performance indicators and focus area of company X and Y (Data ID: 1D-d11 and d18-23) for their mining business segment.

Table 16. Performance focus and strategic focus of competitors.

Subject	Company X	Company Y
Current Performance Indicators	Core process equipment, not plant solutions	Plant solutions
	Life cycle solution contracts	O&M Services producing non-cyclic revenue stream
	Service sales is more the product/plant sales consistently since 2013	
Strategic Focus Area	Upgrade and modernization services	Grow wear part business
	Process optimisation and mine-to mill optimisation	Waste (tailings) management solutions
	Predictive analytics services for equipment by digitalization of process equipment -IoT	Equipment level digitalization integrated to O&M services, but investing in plant level digitalization
	ICT domain partners in digitalization	Focus on customer's productivity improvement by improving availability
	3D Printing	Digitalization strategy linked to predictive maintenance, condition monitoring, spare parts management, utility consumption
	Modular and mobile solutions	Focus on specific minerals business segment

As can be seen in Table 16, the focus of both the competitors is on developing digitalization and capturing value-in-use in plant operation phase. For CAPEX business, company X is more product centric and company Y is more solution centric. In the following Figures 26 and 27, the comparative fit of company X and Y against the case firm are presented respectively with the help of primary data, for the key need elements identified for junior & start-up customer segment in previous sub-section 4.4.

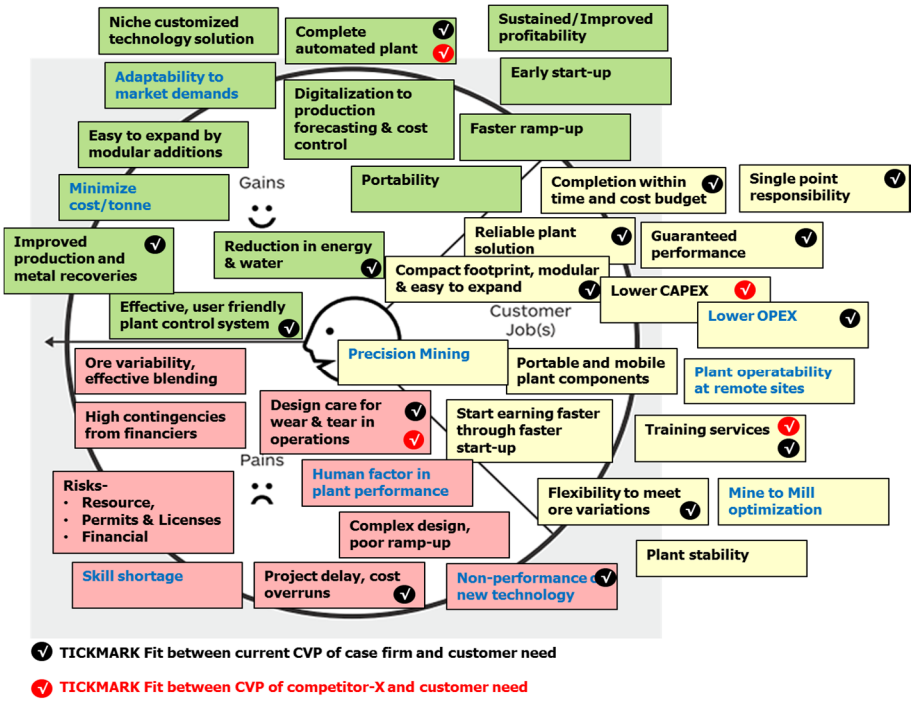

Figure 26. Comparative problem-solution fit of case firm against company X.

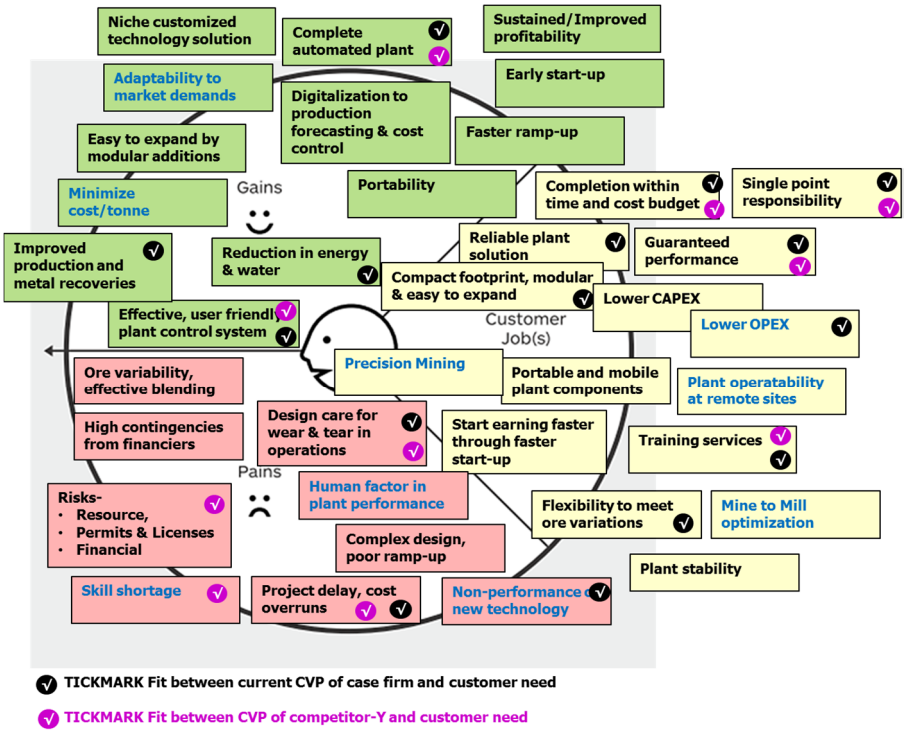

Figure 27. Comparative problem-solution fit of case firm against company Y.

In Figures 26 and 27 above, it can be seen that company X has competitive edge over the case firm by providing lower CAPEX price to win the business and thus opening up opportunity to win value-in-use share of continuous non-cyclic business from the installed

base. On the contrary, company Y is matching case firm's fit in many elements and then creating additional value by providing physical operation and maintenance support for the plant.

From the revenue logic perspective, company X is providing discount in plant solution phase in order to win more profitable life cycle services business. Company Y on the other hand has better EPC capability and in certain cases with smaller scope, they are also earning through the price per tonne (€/t) model through physical operation and maintenance services.

In the next sub-section, the summary of strengths and weaknesses in existing CVP are discussed.

4.6 Summary of the Strengths and Weaknesses of the Existing CVP

Based on the analysis and discussions in the previous sub-sections, the strengths and weaknesses of the existing CVP of the case firm in minerals processing plant projects for the junior & start-up customer segment are summarized in Figure 28. The summary also shows the customer need elements being met through strengths and unmet needs resulting from the weaknesses. In the figure, the weaknesses highlighted in **bold** are selected to be addressed through the new CVP. The non-highlighted weaknesses need strategic decision making at senior management level to be addressed and have significant impact on the operating model of the company. Therefore, these issues are excluded from the scope of the thesis. The study thereby is focused on redesigning the CVP to address the key issues of service orientation in plant solution business offerings; integrating customer perspective in solution design; bringing flexibility in revenue logic model; locking services sales significantly during CAPEX sales phase; and negating the perception of being too expensive. The aim of the new CVP is to provide fit for the unmet customer needs to the maximum extent possible.

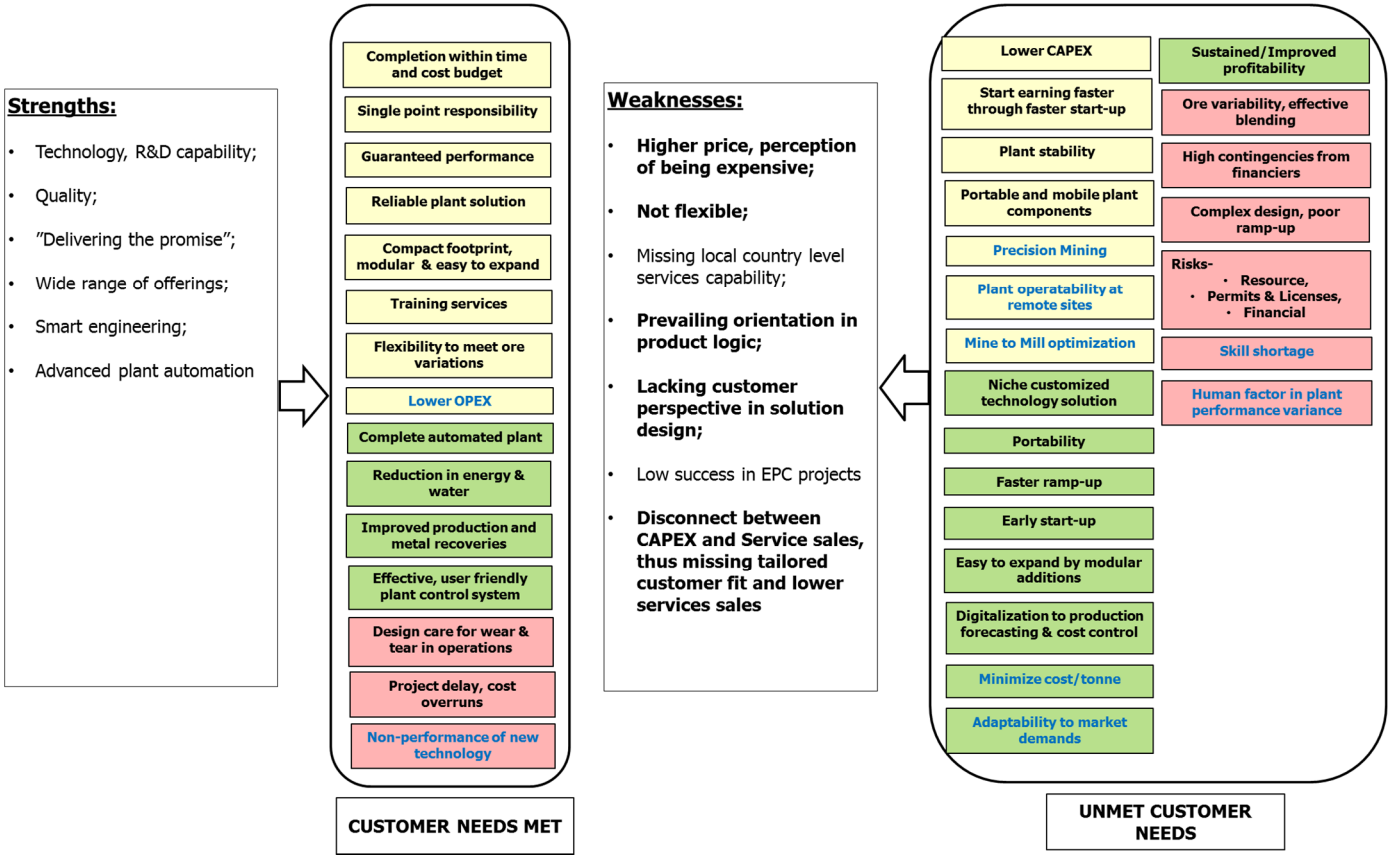

Figure 28. Summary of strengths and weaknesses of case firm's existing CVP.

In the next section, the development of the new CVP for the case firm's minerals processing plants project business is outlined, targeting the customer segment of juniors & start-ups.

5 Development of the New CVP for Case Company

This section describes the development of the new CVP and revenue logic in the case company's minerals processing plants project business for the target customer segment "junior & start-up". Findings from the current state analysis in Section 4 provide the necessary inputs for the new CVP design. The development work is built around the core concepts of value-in-use through service logic and creation of resonating focus in CVP as portrayed in the conceptual framework (Section 3). The CVP development process adopts the tools and frameworks described in Section 3, such as Value Proposition Canvas, Strategy Canvas and customer needing dimensional analysis. The outcome of this section is a new CVP structure to find focus values in CVP, along with a value calculator tool concept to demonstrate the customer value in financial terms. Well known standard formulae of project finance have been applied to create the framework of the value calculator tool.

5.1 Overview of the New CVP Development Stage

The CVP development stage covers many sequential steps. The findings from the current state analysis is the key input to the CVP development work. The data collection and analysis plan is outlined in Data-2 of Section 2. The development steps are described in Figure 29 below.

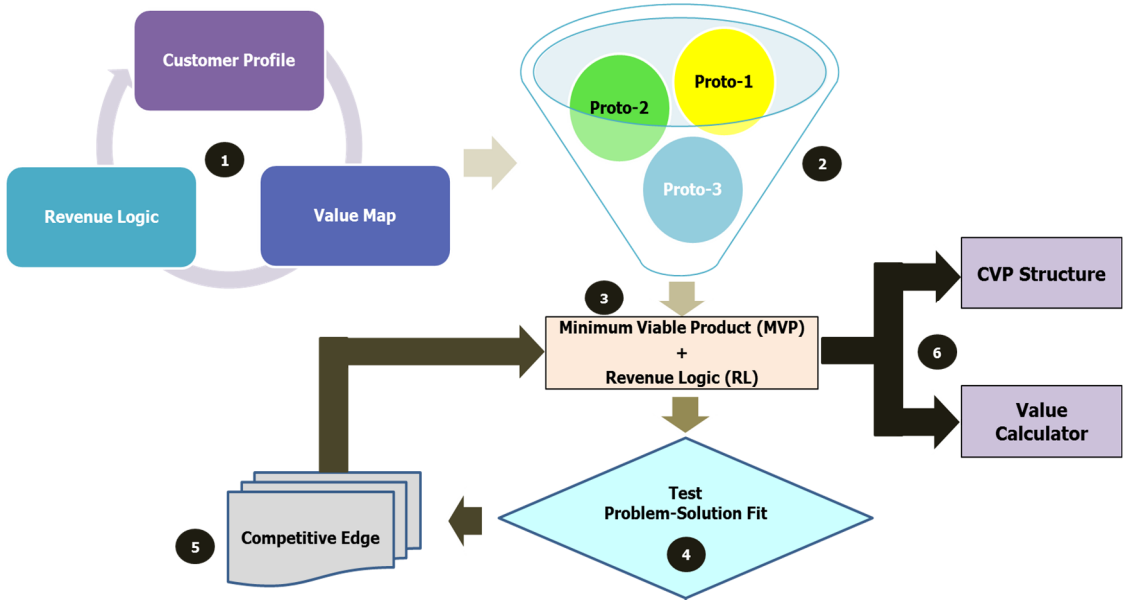

Figure 29. Steps of CVP development in the study.

As presented in Figure 29, the CVP development work was performed in six sequential steps. The first five steps were carried out in a workshop through co-creation. Several internal stakeholders from different functions related to the case firm's minerals processing plants project business and services BU participated in the workshop (Data ID: 2D-w1). The related five steps were: 1) revisiting the customer need profile created in Section 4 for the junior & start-up customer segment, along with the creation of value map and proposal of alternate revenue logic. 2) the first step was done by three parallel cross-functional teams to create three prototypes; 3) discussion and comparison of the three prototypes to identify the most important need and solution elements for the customer segment, so that the minimum viable product (MVP) model could be created along with relevant revenue logics; 4) testing the problem-solution fit in MVP; and 5) finding the competitive edge of new CVP (MVP) against the existing CVP and competitors' CVP.

The above five steps generated input for developing a structural approach for the new CVP and guidance for customer value calculator. Thus the sixth step in this stage was to formulate the new CVP structure that can find the focus customer need and related solution elements for any concentrator plant project in the junior & start-up segment. Also the sixth step included the upgrading of the existing customer value calculator tool (Data ID: 2D-d1) to include the findings from the CVP development workshop.

Finally the results of the new CVP development were presented to the key-stakeholders for review (Data ID: 2D-m1). The review findings were noted for improvement in the next stage of validation. Also the key-stakeholder review meeting resulted in selection of example customer cases for testing in the next stage.

The results of CVP development work is presented sequentially in the following subsections for four key subject areas: identification of new CVP elements and revenue logic to create MVP; finding problem-solution fit and competitive edge in MVP; developing new CVP structure to find the focus customer needs and fitting solution elements; and creating the customer value calculator concept for the new CVP.

5.2 Identification of New CVP Elements and Revenue Logic

The findings of the current state analysis were the main starting points of the CVP development. First the customer need profile for junior & start-up business segment was

revisited to rank the customer jobs, pain and gain elements, so that the most important elements can be filtered in.

Then value mapping of the case firm's CVP was carried out to maintain the strengths of the existing CVP and simultaneously address the key weaknesses identified, such as lack of service orientation in plant solution business offerings, missing customer perspective in solution design; and isolated services sales from the CAPEX sales phase. Also alternate revenue logics were devised to address the weakness of being perceived as expensive and bring flexibility in the revenue model.

The work described above was first executed through co-creation of three prototypes in the workshop. Figure 30 shows the three prototypes of new CVP.

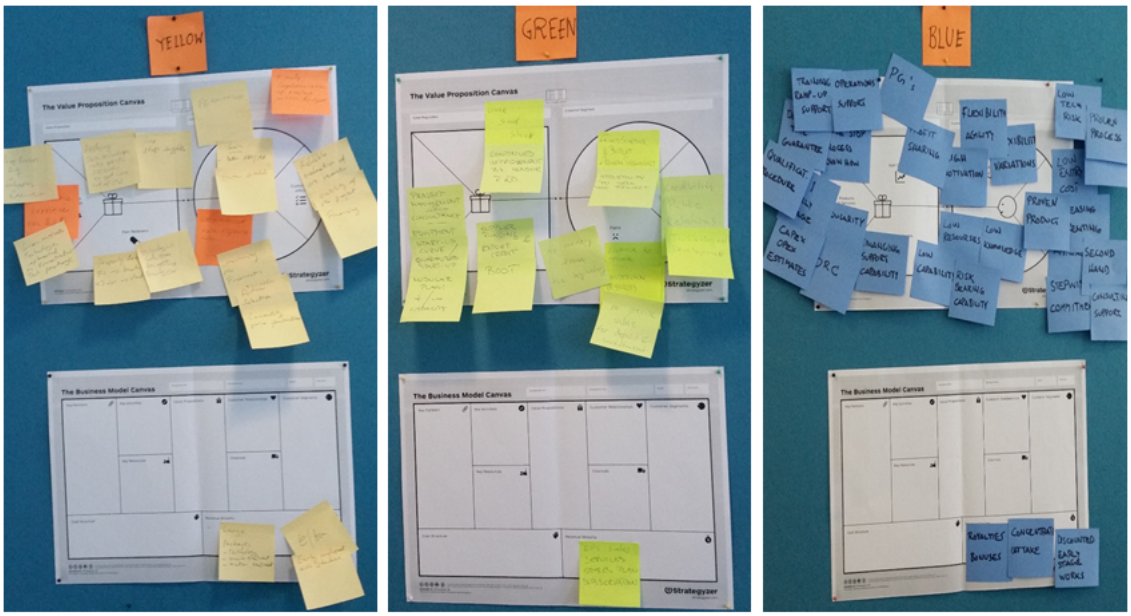

Figure 30. Prototypes for new CVP created in the workshop (Data ID: 2D-w1).

After discussion and analysis of the three prototypes, one Minimum Value Product (MVP) model was created in the workshop, meeting the common important customer needs. The MVP thus created consists of elements, which are part of the existing or evolving portfolio of the case firm and do not require large scale new innovations. It was agreed to adopt the 'extend' model as described in sub-section 3.2.2, for creating the MVP. Following Figure 31 represents the macro view of the problem-solution fit between revisited customer need profile and MVP on Value Proposition Canvas.

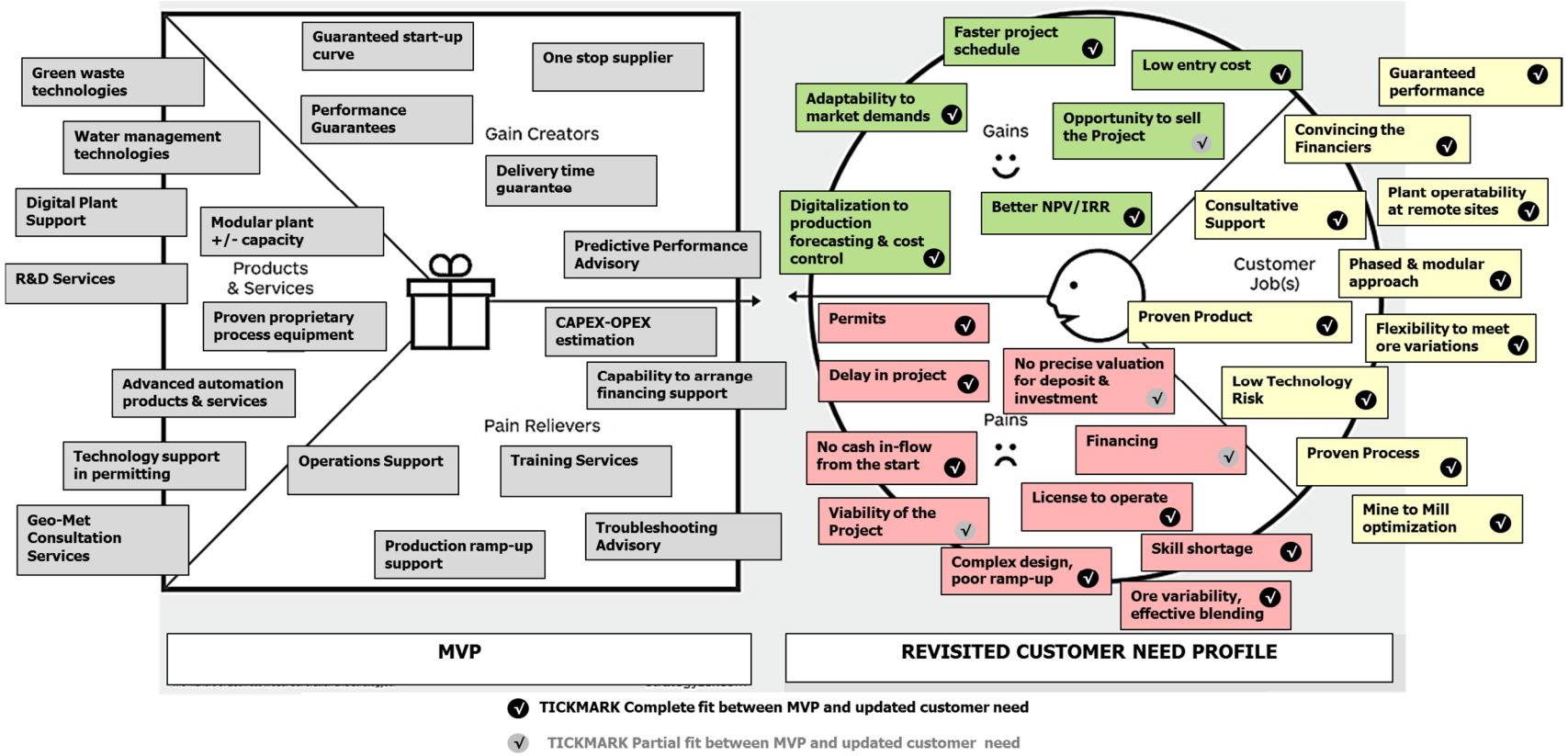

Figure 31. Problem-Solution fit between updated customer need profile for Junior & Start-up segment and MVP.

When Figure 31 is compared to the Value Proposition Canvas prepared for the existing CVP of the case firm (Figure 21 in Section 4), the customer need elements have been updated and reduced from 37 (15 key jobs, 9 pain elements, 13 gain elements) in the current state analysis stage to 26 (10 key jobs, 10 pain elements, 6 gain elements). The corresponding MVP has 9 components in key products and services in the sales mix, which creates 5 gain enablers and 6 pain relievers.

Figure 33 also presents the macro-view of the problem-solution fit between MVP and the updated customer need profile. Even though the minerals processing plant part of the project cannot be alone responsible for achieving any of the customer needs completely, the **BLACK** tick-marks represent the customer needs where the MVP can play a major role in customer satisfaction. **GRAY** tick-marks represent the customer needs which are partially met by the MVP and these needs are highly dependent on the performance in mine design and operations, project financial structure and product marketing in the customer sphere.

The detailed micro-analysis of the problem-solution fit and identification of MVP elements providing competitive edge are described in the sub-section 5.3 later.

The other component in the prototypes was the concept of new revenue logic models. After discussion and debate in the proposal development workshop, the following alternate revenue logic models (Figure 32) were selected for further investigation and follow-up in the next stage of testing and validation.

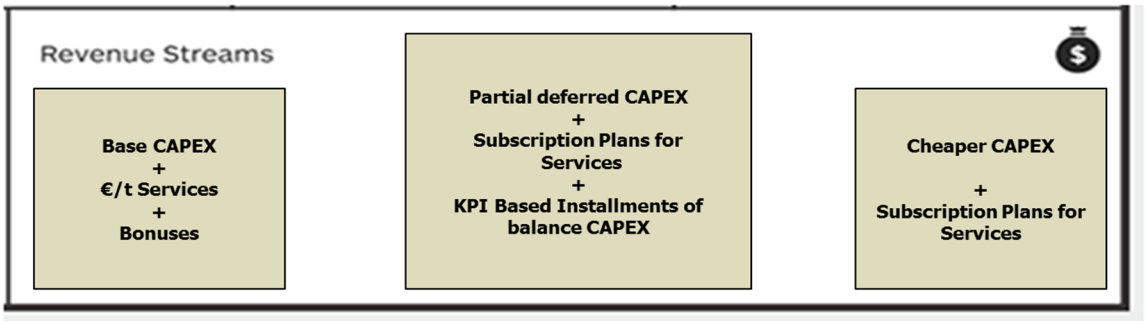

Figure 32. New revenue logic models for MVP.

In summary, Figure 32 presents the three alternate revenue logic models in minerals processing plants project business for the case firm which are conceptualized to deliver the MVP and address the weaknesses of the existing revenue logic: 1) providing mutually acceptable discount to customer in the plant CAPEX sales and inclusion of extended services scope for plant operation phase in the CAPEX contract; 2) inclusion of upfront services scope for plant operation phase during the CAPEX sales negotiation by providing a cost/tonne guarantee on the customer's OPEX (limited to the part influenced by case firm's scope of services) and performance incentives in the form of bonuses (partial profit sharing by customers) in case of superior performance compared to baseline guarantee; and 3) partial deferment of CAPEX value to yearly instalment based payments (linked to certain Key Performance Indicators (KPI) in the operation phase, which are directly impacted by plant design) but with inclusion of extended services scope for the plant operation phase in the CAPEX contract. For all the three revenue logic models, the

case firm can provide various levels of subscription models regarding the services scope to the customer and the level of subscription model shall guide the financial benefits or risks that the case firm is willing to provide to the customer or accept. Looking at revenue logics from the perspective of Kowalkowski et al. (2015), the first revenue logic is still rooted in the equipment supplier role, the second revenue logic is for the trajectory to attain availability provider role and the third revenue logic is for the trajectory to become the performance provider.

A detailed analysis of the revenue logic models and their implications are described later in sub-section 5.5.

5.3 Search of Fit and Competitive Edge

To create a CVP structure for finding the competitive edge and then to create points of differentiation, the first step is to fit the CVP elements against individual customer need elements. This requires micro-analysis of the problem-solution fit. First the individual customer need dimensions from Figure 31 in the previous sub-section were mapped in the customer needing framework, explained before in sub-section-3.2.1. Then the individual need elements were fitted with the solution elements from the MVP, also visible in Figure 31. The micro-fit results are presented in the following interconnected Tables 17 and 18.

Table 17. List codes for solution elements in MVP.

S.No.	MVP Solution Element	S.No.	MVP Solution Element
1	R&D Services	11	Production ramp-up support
2	Guaranteed start-up curve	12	Operations Support
3	Performance Guarantees	13	Technology support in permitting
4	One stop supplier	14	Advanced automation products and services
5	Delivery time guarantee	15	Modular plant +/- capacity
6	Predictive Performance Advisory	16	Water management technologies
7	CAPEX-OPEX estimation	17	Green waste technologies
8	Capability to arrange financing support	18	Proven proprietary process equipment
9	Training Services	19	Digital plant support
10	Troubleshooting Advisory	20	Geo-Met consultation services

Table 18. Need classification of need elements and micro fit with solution elements in MVP.

Expected Gains
Pain Points
Jobs to do

Needing Dimension	Needing Function	Need Element	Fit with MVP Solution Element
Doing	Relieving	Permits	1, 13, 16, 17, 18
		License to operate	1, 13,16, 17
		Guaranteed performance	1,2,3,6,9,10,11,12, 14, 18,20
		Viability of the project	1,3,7,8,11
	Enabling	Opportunity to sell the Project	1,2,3,7,18,20
		No cash in-flow from the start	2, 11
		Low entry cost	7,8,15
		Skill shortage	6,9,10,11,12,14,19
		Adaptability to market demands	1,6,7,12,14,15, 19
		Financing	2,3,5,8
Experiencing	Sheltering	Ore variability, effective blending	1,6,12,14,19,20
		Complex design, poor ramp-up	1,2,3,4,6,11,12,14, 19, 20
		Plant operatability in remote sites	2,3,4,6,9,10,12, 14, 19
		No precise valuation for deposit and investment	1,7,16
	Energizing	Digitalization to production forecast-ing and cost control	1,6,7,14, 19
		Better NPV/IRR	2,3,6,11,14
Scheduling	Time-framing	Delay in project	2,5,11,15
	Timing	Phased and modular approach	1,15
		Faster project schedule	2, 4,5, 11

Table 17 shows the codes of the solution elements in MVP, which are further used in Table 18. As it is evident from above Table 18, each of the customer needs can be fulfilled by a combination of several solution elements and vice versa. For the customer needs, it is also to be noted that only the pain and gain elements were mapped as they represent the majority of the customer jobs. However, three customer jobs were included in the table, as they either represent a customer job of absolute importance in nature (Guaranteed performance) or very unique in nature (Plant operatability in remote sites,

Phased and modular approach). The map shows that the majority of the needs belong to the needing dimensions of 'Doing' and 'Experiencing' and if broken down further, to relieving, sheltering and enabling functions in increasing order. Looking closely, the need elements can be broadly classified to :1) fears and uncertainty in necessary licensing and permitting process, quite crucial and potential showstopper for junior & start-up companies with limited or no existing credentials (permits, license to operate); 2) capacity to develop and execute the project in the operational phase (delay in project, faster project schedule); 3) technology risks (guaranteed performance); 4) financial feasibility of the project (viability of the project, low entry cost, no cash in-flow from the start, no precise valuation for deposit and investment, better NPV/IRR); 5) getting the necessary project financing with acceptable terms (guaranteed performance, low entry cost, permits, financing); 6) uncertainties and bottlenecks in plant operation plan (skill shortage, ore variability and effective blending, complex design leading to poor ramp-up, plant operatability in remote sites, digitalization to production forecasting and cost control);7) opportunistic needs (opportunity to sell the project, adaptability to market demands, phased and modular approach). Each customer need element was looked at through the MVP elements and MVP elements were selected to fit with the need elements. The micro-fit created accordingly is presented in Table 18 as well.

The next step in this process was to find the competitive edge of the case firm for each element in the new CVP, as compared to competitor companies X and Y. Following Table 19 represents the analysis of competitive edge for each of the solution element.

Table 19. Competitive edge of MVP elements.

S.No.	MVP Solution Element	Case Company Competence	Exists in Market	Competitor Competence
****** Strong; *** Medium, ** Low, * Emerging, n/a Non-existing**				
1	R&D Services	****	Y	**
2	Guaranteed start-up curve	**	Y	**
3	Performance Guarantees	****	Y	***
4	One stop supplier	****	Y	****
5	Delivery time guarantee	****	Y	****
6	Predictive Performance Advisory	**	N	*
7	CAPEX-OPEX estimation	***	Y	***
8	Capability to arrange financing support	***	Y	***
9	Training Services	***	Y	****
10	Troubleshooting advisory	****	Y	***
11	Production ramp-up support	***	Y	***

S.No.	MVP Solution Element	Case Company Competence	Exists in Market	Competitor Competence
12	Operations Support	**	Y	***
13	Technology support in permitting	*	Y	n/a
14	Advanced automation products and services	****	Y	***
15	Modular plant +/- capacity	*	N	*
16	Water management technologies	***	Y	***
17	Green waste technologies	***	Y	**
18	Proven proprietary process equipment	****	Y	****
19	Digital plant support	***	N	**
20	Geo-Met consultation services	***	N	*

As shown in Table 19, the competence of the case firm was first analysed for individual solution element, relative to the competence of competition (combined for company X and Y). Also the remark was provided for the solution element, whether it exists in the present market offerings in the industry or not.

From the above detailed analysis for competitive edge in MVP elements and the previous discussion on existing CVP and RL of competitors (sub-section 4.5) , the key competitive factors were devised which influence the customer decision making for the minerals processing plants, both in execution and operation phases. For selection of competitive factors not only the competitive factors in the case firm were selected, but also the existing competitive factors of competition were looked at. Following Figure 33 presents the positioning of the case firm's existing CVP, new CVP (MVP), CVP of company X and CVP of company Y on strategy canvas for these competitive factors.

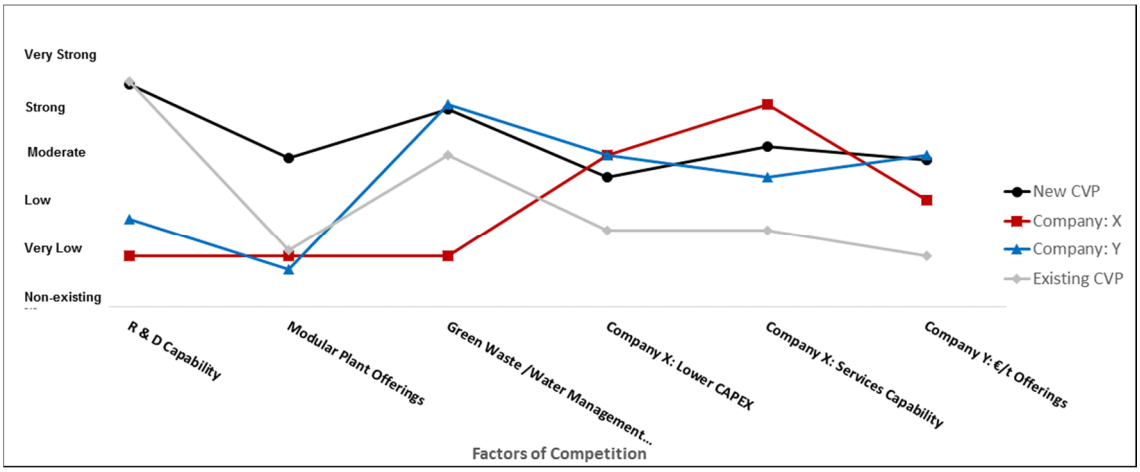

Figure 33. Competitive strategy canvas.

Hence, the new CVP of the case firm in minerals processing plants project business for junior & start-up segment aims at maintaining the strong competitive position in R&D capabilities for technology, improving the present position in green waste and water management technologies and innovating the revenue logic to address the need of lower CAPEX in the target customer segment. The case company also intends to utilize the existing engineering capabilities to include modularity substantially in plant offerings. From the service orientation perspective, the new CVP shall be more integrated with services offerings, with the possibility of cost/ tonne based revenue earnings.

In this phase of work, the live customer cases from the segment of 'junior & start-up' for minerals processing plants project business were screened from the case firm's CRM system by the key stakeholders in a review meeting (Data ID: 2D-m1). Two cases were chosen for developing the competitive service centric CVP and testing, validation in the next phase of work (described in Section 6 along with case description).

The MVP or new CVP developed for the target customer segment and further micro-analysis of fit and competitive edge as presented herein were then used to concoct a new CVP structure. The concept of the structure is presented in the next sub-section.

5.4 CVP Structure to Find Focus Value

The CVP structure can be utilized to find the focus value for the customer in any minerals processing plants project. The objective of the structure development was to determine the resonating focus for the case firm, which could then be used as the core of the CVP in the proposal to the customer in the junior & start-up segment. Figure 34 below presents the template of the CVP structure. The left hand side of the figure presents the customer need prioritization and right hand side presents the CVP elements fitting the prioritized needs.

CUSTOMER NEED PRIORITIZATION

Need Element	Fit with MVP Solution Element	Project Need Scale: 1(Lowest)-5 (Highest)
Permits	1, 13, 16, 17, 18	
License to Operate	1, 13,16, 17	
Guaranteed performance	1,2,3,6,9,10,11,12, 14, 18,20	
Viability of the Project	1,3,7,8,11	
Opportunity to sell the Project	1,2,3,7,18,20	
No cash in-flow from the start	2, 11	
Low entry cost	7,8,15	
Skill shortage	6,9,10,11,12,14,19	
Adaptability to market demands	1,6,7,12,14,15, 19	
Financing	2,3,5,8	
Ore variability, effective blending	1,6,12,14,19,20	
Complex design, poor ramp-up	1,2,3,4,6,11,12,14, 19, 20	
Plant operatability in remote sites	2,3,4,6,9,10,12, 14, 19	
No precise valuation for deposit & investment	1,7,16	
Digitalization to production forecasting & cost control	1,6,7,14, 19	
Better NPV/IRR	2,3,6,11,14	
Delay in project	2,5,11,15	
Phased and modular approach	1,15	
Faster project schedule	2, 4,5, 11	

FINDING VALUE ENABLERS IN PROJECT

S.No.	MVP Solution Element	Occurence in high ranked needs	Case Company Competence	Exists in Market	Competitor Competence
1	R&D Services	0	****	Y	**
2	Guaranteed start-up curve	0	**	Y	**
3	Performance Guarantees	0	****	Y	***
4	One stop supplier	0	****	Y	****
5	Delivery time guarantee	0	****	Y	****
6	Predictive Performance Advisory	0	**	N	*
7	CAPEX-OPEX estimation	0	***	Y	***
8	Capability to arrange financing support	0	***	Y	***
9	Training Services	0	***	Y	****
10	Troubleshooting Advisory	0	****	Y	***
11	Production ramp-up support	0	***	Y	***
12	Operations Support	0	**	Y	***
13	Technology support in permitting	0	*	Y	n/a
14	Advanced automation products & services	0	****	Y	***
15	Modular plant +/- capacity	0	*	N	*
16	Water management technologies	0	***	Y	***
17	Green waste technologies	0	***	Y	**
18	Proven proprietary process equipment	0	****	Y	****
19	Digital plant support	0	***	N	**
20	Geo-Met consultation services	0	***	N	*

Figure 34. CVP structure template for finding resonating focus in a plant project business case.

Metropolia

As can be seen from Figure 34, the process is cyclic in nature. The new CVP structure template to find the focus value, as shown in Figure 34, can be utilized by using the following sequential steps.

First, the customer need elements are prioritized in the context of the concerned customer's specific project by ranking them on a scale from 1 to 5.

Then in the second step, the top ranked need elements (with rank > 4) are looked at from the perspective of the MVP solution elements. The results from the micro-analysis of the problem-solution fit in the previous sub-section are available in the template (Column 'Fit with MVP Solution Element' in the *'customer need prioritization'* section).

In the third step, the occurrence of the most prominent CVP elements meeting the top ranked need elements is to be analysed in *'finding value enablers in project'* section of the template. All the solution elements occurring even once need to be considered in the proposal to the customer. But the solution elements occurring more often represent the critical solution elements which can help the case firm to meet most of the top priority need elements.

In the fourth step, the critical solution elements are evaluated for competitive edge. The search for competitive edge has two components: whether the element is better or equal or inferior to the competition (capability of companies X and Y together). Thus from the template, the critical solution elements are then classified to either as points of differentiation or points of parity or points of contention.

In the fifth step, the top ranked customer needs identified in the third step are looked at again through the lens of points of differentiation. Ideally all top ranked needs should be met with, but in reality only few need elements can be found, which are met by the points of difference to a great extent. Again, all the top ranked needs should be visible in the CVP, but only the top need elements having fit with points of differentiation create a unique value proposition for the customer.

The few top priority needs which are met by the points of differentiation, together create the resonating focus for the case firm in the specific project. Thus the thesis objective of customer centric and service logic based creation of customer value proposition could be achieved through the development of the CVP structure template.

The follow-up activity was to formulate the customer value calculator concept, which could demonstrate the resonating focus in CVP financially and make use of alternate service oriented revenue logic models, developed as an extension of the MVP (sub-section 5.2). The same is described in the following sub-section 5.5.

5.5 Customer Value Calculator Concept

Three alternate revenue logic models emerged in the co-creation with the internal stakeholders during the workshop (Figure 32 in sub-section 5.2) for the case firm to deliver the new CVP to the customer. Each of the revenue logic models differs regarding the scope of services of the case firm and resulting value-in-use for the customer and the case firm.

First, the tangible implications of each revenue model on the customer and the case firm are to be understood. Following Table 20 details the implication of the existing and new alternate revenue logic models for both the customer and the case firm.

Table 20. Implications of alternate revenue logic models.

S.No.	REVENUE MODEL	SCOPE OF CASE FIRM				PENALTY SITUATIONS	IMPACT ON CUSTOMER VALUE-IN-USE	IMPACT ON CASE FIRM
		PLANT PROJECTS		OPERATIONAL PHASE				
		CAPEX	SERVICES	MATERIALS	SERVICES			
I	Base case (Only CAPEX)	Products and Plants	R&D, Engineering, Commissioning	Commissioning and insurance spares	None	1. Project delay 2. Performance guarantee demonstrated in limited time	• Promised value-in-use potential , which is to be generated by customer	• One-time value earned by winning in CAPEX level competition
II	Base case + Separate subsequent deals on post CAPEX services (Present way of working)	Products and Plants	R&D, Engineering, Commissioning	Commissioning and insurance spares + O&M spares for certain proprietary equipment	Plant audits, maintenance services, training services	1. Project delay 2. Performance guarantee demonstrated in limited time	• Promised value-in-use potential , which is to be generated by customer	• One-time value earned by winning in CAPEX level competition • Partial continuous value through services by winning in various operational level competitions

S.No.	REVENUE MODEL	SCOPE OF CASE FIRM				PENALTY SITUATIONS	IMPACT ON CUSTOMER VALUE-IN-USE	IMPACT ON CASE FIRM
		PLANT PROJECTS		OPERATIONAL PHASE				
		CAPEX	SERVICES	MATERIALS	SERVICES			
III	Discount in CAPEX investment + Upfront agreement on post CAPEX services in subscription model	Products and Plants	R&D, Engineering, Commissioning	Commissioning and insurance spares + O&M spares for all proprietary equipment	Plant audits, maintenance services, training services, ramp-up support	1. Project delay 2. Performance guarantee demonstrated in limited time	• Promised value-in-use potential , which is to be generated by customer; • Increased plant availability	• Non-cyclic continuous value earned by winning in CAPEX level competition and reducing operational level competitions
IV	Base case CAPEX + Upfront agreement on post CAPEX services in subscription model with guaranteed €/t of Plant OPEX (partial/full) + Bonus/Royalties for superlative performance over guaranteed values	Products and Plants	R&D, Engineering, Commissioning	Commissioning and insurance spares + O&M spares and wear parts for all process equipment	Training services, ramp-up support, operation services, maintenance services, remote services	1. Project delay 2. Performance guarantee demonstrated in limited time 3. Penalties in service payments for deviations in guaranteed €/t	• Increased plant availability and stability ; • Potential increase in metal recoveries	• Non-cyclic continuous value ensured by winning in CAPEX level competition; • Reduced CAPEX level competition; • Elimination of operational level competition
V	Partial deferral of CAPEX to operational phase in yearly instalment model for limited start-up years = Non-deferred part of CAPEX + Upfront agreement on post CAPEX services in subscription model + performance KPI based yearly instalments for deferred amount of CAPEX	Products and Plants	R&D, Engineering, Commissioning	Commissioning and insurance spares + O&M spares and wear parts for all process equipment	Training services, ramp-up support, predictive advisory services, maintenance services, remote services	1. Project delay 2. Penalties in KPI based deferred CAPEX payments for deviations in KPI performance	• Increased plant availability and stability ; • Adaptive and consistent metallurgical performance; • Increase in metal recoveries	• Non-cyclic continuous value ensured by winning in CAPEX level competition; • Further reduction in CAPEX level competition; • Elimination of operational level competition

To demonstrate the differences in generated financial value to the customer, the value calculator tool was conceptualized to include the existing and new alternate revenue models and associated differing scope of services for the case firm, as shown in Table 20. A value calculator tool already existed in the case company (Data ID: 2D-d1) and the same was modified and updated to include the new concept. The structure of the value calculator model is presented in Figure 35 below.

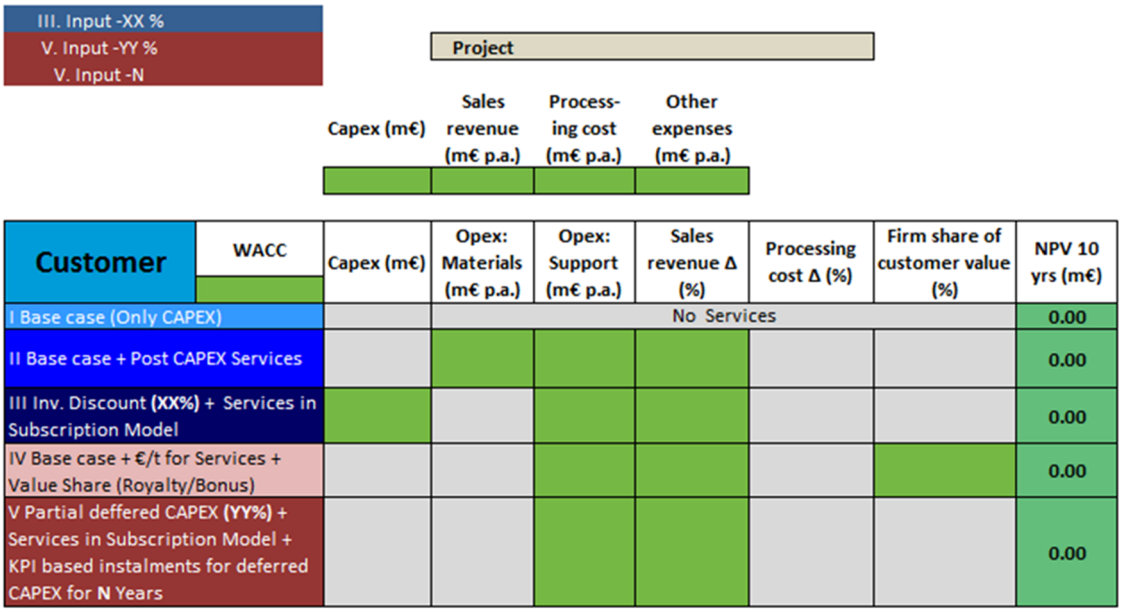

Figure 35. Customer value calculator model.

The key inputs in the customer value calculator model, as shown in Figure 35, are: CAPEX outlay of customer for the concentrator plant; customer sales revenue; plant processing cost (OPEX); other operational expenses; weighted average cost of capital (WACC) or discount rate for customer in the project; customer's yearly spend base on materials in OPEX (part of the overall baseline OPEX); customer's yearly spend on support services (additional to baseline OPEX) in each revenue model; calculated increase in sales revenue while moving to each revenue model and associated scope; and calculated change in OPEX for each revenue model and associated scope. The key variables are amount of discount (XX%) in CAPEX deal for revenue model-III; share of customer net value-in-use (% of profit) with the case firm in the form of bonus for revenue model IV; and amount of partial deferral of CAPEX (YY%) and number of years for instalment based payment of deferred portion (N) for revenue model-V.

The key comparative output metrics in the value calculator are the 10-year NPV (Net Present Value) shown in the last column of Figure 35, spread of yearly cash flow (CF) and cumulative discounted cash flow (DCF), which are shown in following Figure 36 (demonstrative example).

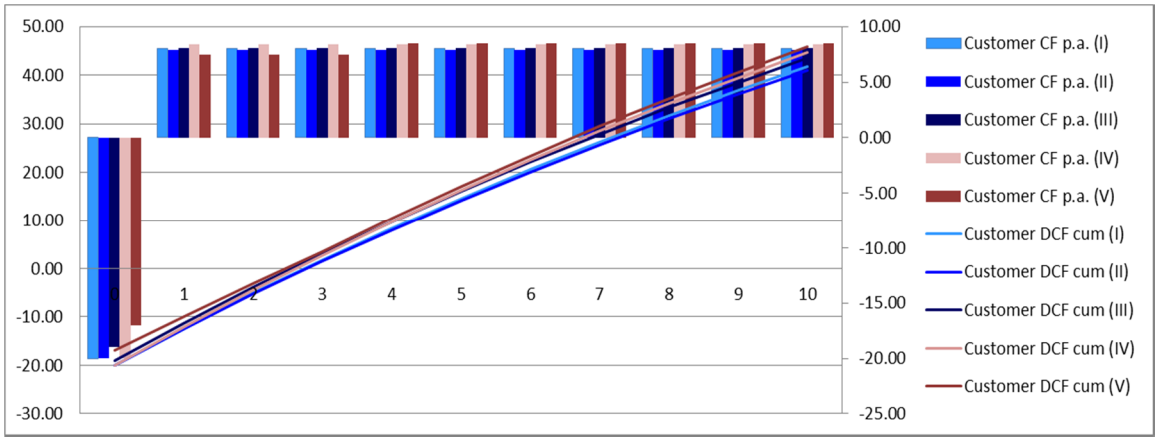

Figure 36. Example results from customer value calculator.

Thus from above Figure 35 and 36, the customer can draw the conclusion regarding which revenue model and associated scope of the case firm are likely to bring more financial value to the project, encompassing both the execution and operational phases. The other non-tangible and tangible value-in-use aspects such as risks, reduced inconsistency in business performance can be assessed by the customer separately through their own interpretations from these results.

The next sub-section summarizes the process and outcome achieved in the development of the new CVP.

5.6 Summary of New CVP

The method adopted for developing the new CVP was co-creation with the internal stakeholders through a workshop and subsequent review done by the key stakeholders. The business challenge, objective and intended outcome of the thesis were re-evaluated at the start of the proposal building stage in the context of findings from the current state analysis. The weaknesses identified in the current state analysis were revisited and focus weaknesses were identified as targets. However, keeping the existing and emerging strengths were noted as important. The co-creation method started with creating three alternate prototypes for the new CVP meeting prioritized customer needs in the target customer segment of ‘junior & start-up’.

Firstly, the customer need profile, which was established in the current state analysis, was reviewed to find the priority needs relevant for the customer segment and applicable to both concentrator plant project execution and operational phases. As a result, the initial total 37 customer need elements were filtered to 26 priority need elements, including key jobs, pains and gains.

Secondly, the developed prototypes were looked at to formulate the minimum viable product (MVP) , which on macro-level has a good level of fit to the revised customer need profile. Also three new alternate revenue logics (RL) were conceptualized for delivering the new CVP to the customer, addressing the issues of service orientation and perception of being expensive.

Thirdly, the micro-analysis of problem-solution fit were carried out for each customer need element with the MVP solution elements. The following action was to find competitive edge for each of the MVP elements against the competitors X and Y. The competitive landscape developed thereby provided direction to find competitive factors, which also included the insights from the revenue logic models. Henceforth, the competitive positioning of the new CVP was established in strategy canvas against the existing CVP and the competitors. Thus the competitive factors of the new CVP were found to be the existing strength in R&D for technology development, green waste and water treatment technologies and improved positions in service focus through both solution elements and innovative revenue logics.

Fourthly, the findings and analysis were used to develop a CVP structure to search for the focus customer values and points of differentiation in CVP. Finally, the customer value calculator concept was developed to demonstrate the financial benefits to the customer in terms of value-in-use, when different revenue logic models with varying scope of service offerings are utilized.

Thus in summary, the new CVP developed herein has greater customer orientation for finding the true customer needs. The developed solution has two components: 1) CVP structure to find project specific key needs of the customer and superior solution elements in the value map of the case firm to satisfy them; and 2) customer value calculator to evaluate and demonstrate value generated through alternate service centric revenue logics with varying levels of services. These two components together define the outlook of the CVP and associated revenue logic suiting best for the specific concentrator plant project of the customer. Two ongoing customer cases were chosen for testing and validation in the next phase. The testing and validation of the new CVP are described in the next section, along with assessment and feedback for improvements.

6 Validation of the New CVP

This section describes the testing and validation of the new CVP and revenue logic (RL) models in the case company's minerals processing plants project business for the target customer segment "junior & start-up". The subsequent evaluation and feedback for improving the proposal are captured in this section as well.

6.1 Overview of the Validation Stage

The proposal validation work continued the co-creation approach adopted in proposal development (Section 5). The CVP structure and the value calculator tool were the objects to be tested and validated and then the overall approach of designing the service oriented CVP was evaluated with a bird's eye-view.

The key inputs to the testing and validation were the data and documents (3D-d1 and d2) from live customer cases, which were selected in a key-stakeholder review meeting during the proposal build-up. A summary of the test cases is presented in Table 21.

Table 21. Selected customer cases for testing and validation.

CASE	CUSTOMER TYPE	PROJECT TYPE	LOCATION	COMMODITY/ MINERALS
Customer Case-A	Start-up	Greenfield	Europe	Emerging raw material for electric vehicles
Customer Case-B	Start-up	Greenfield	Americas	Precious metals

The customer case-A was selected as the primary case for testing and validation, as the sales team was available locally for inputs and co-creation and a customer meeting could be set-up for reviewing the new CVP. This enabled the case to undergo a full cycle of validation. First, the case was introduced to the co-creation team (Data ID: 3D-w1 and w2) and then the CVP was developed for the customer in the workshops by using the template for finding resonating focus. Then, alternate revenue logics were tested in the value calculator for demonstrating the customer value for each route. Finally, the new CVP approach was presented to the customer in the customer meeting (Data ID:3D-c1) and focus values were again determined through co-creation with the customer.

The customer case-B was selected to be the secondary case. Both the sales team and customer are located in Americas for this case. Hence, remote working methods (Email and phone communications) were adopted to collect inputs and feedback from the sales

team (Data ID: 3D-e1) working on the case. The sales team provided necessary inputs for the CVP structure through Emails and the researcher worked on the structure to find resonating focus for the case. The results were communicated to the sales team and subsequent feedback was collected.

The alternate revenue logic models were analysed for associated risks in the workshops. Thereafter, the risk analysis results were used to reconsider the capability of the case firm to perform in the alternate models and, thereby, fine-tune the models. However, this was not done from the business model analysis perspective, but to exclude the possibility of proposing very high risk revenue logics as an outcome of the study.

Finally, the study outcome was evaluated by the co-creators and the key stakeholders to provide feedback for improvements. The customer value calculator concept was reviewed in the finance review meeting (Data ID: 3D-m1) to identify mistakes and collect feedback for improvements. The study results were then presented in a key stakeholder and management approval meeting (Data ID: 3D-m2) to obtain a decision on the new CVP and to determine a future course of actions. With the feedback collected from these activities along with the feedback collected from the customer meeting for case-A and Email communications for case-B, the new CVP was updated to arrive at the final CVP.

In the following sub-section, the testing and validation with the customer cases are described.

6.2 Test of the CVP with Customer Cases

As described in the previous sub-section, two customer cases were subjected to the test. For each of the case, the first step was to determine the most important needs of the customer for the specific project and then to find the points of differentiation in the CVP to meet the focus needs, either partially or fully. Also the points of parity and points of contention were determined for the focus needs to understand the competitive positioning in the project. The second step was to use the customer value calculator tool to evaluate the revenue logics with the scope of the case firm varying to include the resonating focus determined in the first step. The outcome of this step is the most suitable revenue logic to deliver the resonating focus to the customer.

6.2.1 Primary Case

The customer case-A was selected to be the primary case. The customer in this case is a start-up mining company in Europe with no existing mining operations. The project is to develop an ore deposit of emerging raw materials which is in high demand for electric

vehicles, the emerging technology disruption to meet the global demands of sustainability. This greenfield project involves development of mines and then extraction of the target minerals through a minerals processing plant. The capacity of the proposed operation is relatively small, when compared to the giant scale of mining operations in established minerals and metals. The project is currently in the stage of obtaining necessary permits and licenses. The case firm has been involved with the customer in the development and feasibility stages of the project by developing the process flowsheet and technologies. The case firm is keen to support the customer in the project execution and operation stages of the minerals processing plant.

First, the resonating focus in the CVP for the customer was determined from the CVP structure template in the workshops (Data ID: 3D-w1 and w2), using the methodology described in Section 5. The summary of the internal findings are presented in Table 22 below. The detailed results are provided in Appendix 3.

Table 22. Resonating focus for customer case –A (internal workshops).

TARGET TOP CUSTOMER NEEDS	SOLUTION ELEMENTS FOR PROBLEM-SOLUTION FIT		
	POINTS OF DIFFERENCE	POINTS OF PARITY	POINTS OF CONTENTION
Guaranteed performance	R&D Services	Guaranteed start-up curve	Operations Support
Complex design, poor ramp-up	Performance Guarantees	One stop supplier	
Digitalization to production forecasting and cost control	Predictive Performance Advisory	Delivery time guarantee	
Better NPV/IRR	Production ramp-up support	Capability to arrange financing support	
Delay in project	Advanced automation products and services		
	Digital plant support		
	Geo-Met consultation services		

The resonating focus was re-evaluated with the customer in the customer meeting (3D-c1) and the results summary is presented in Table 23 below. The detailed results are provided in Appendix 4.

Table 23. Resonating focus for customer case –A (customer meeting).

TARGET TOP CUSTOMER NEEDS	SOLUTION ELEMENTS FOR PROBLEM-SOLUTION FIT		
	POINTS OF DIFFERENCE	POINTS OF PARITY	POINTS OF CONTENTION
Viability of the Project	R&D Services	Guaranteed start-up curve	
Financing	Performance Guarantees	Delivery time guarantee	
Complex design, poor ramp-up		Production ramp-up support	
Better NPV/IRR			
Delay in project			

As can be seen in Table 22 and 23, there were differences between the resonating focuses when viewed from the inside-out and when viewed from the outside-in and these findings provide credible insights. There were three focus needs out of five in customer view, which were already identified by the co-creators in the case firm. The other two needs were not possibly picked during the co-creation stage because the case-firm is unable to provide complete solutions to these needs (See discussion in sub-section 5.2 on Figure 31). Regarding the points of difference, parity and contention, the comparison shows that all the competitive solution elements were rightly selected in the co-creation stage, which were also viewed as valuable by the customer. Nevertheless, the selection of points of difference needs to be more ruthless in execution to achieve a more focussed proposition.

Following Figure 37 presents the value-in-use generated through alternative revenue logic models for customer case-A. The key input view for the model is provided in Appendix 5. However, for confidentiality between the case firm and the customer, all the inputs were rebased to the CAPEX outlay requirement of 100 million Euros. Thus all the necessary input parameters were proportionately and logically changed to the plant capacity and requirement, needing CAPEX investment of 100 million Euros by the customer.

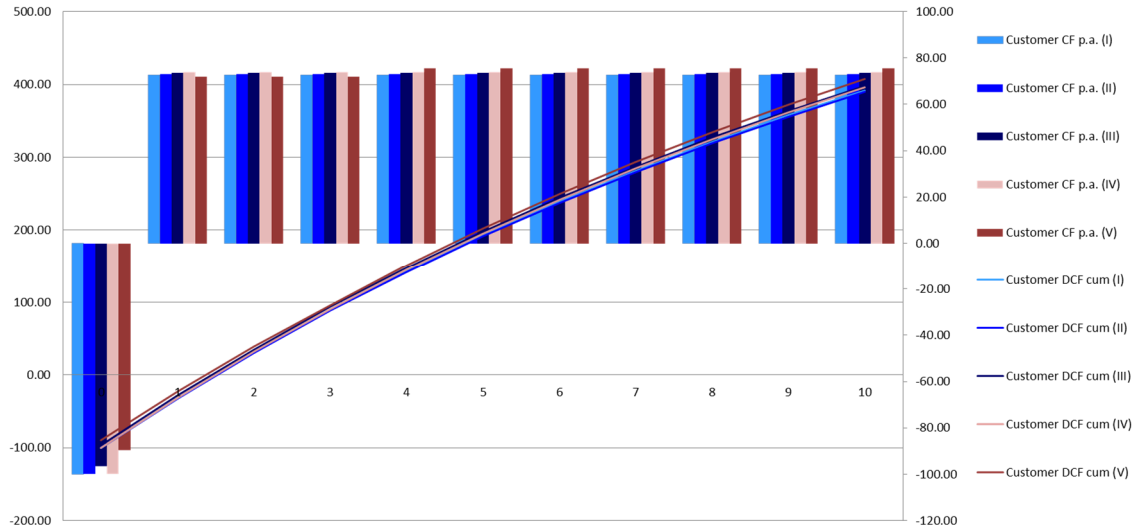

Figure 37. Customer value in different revenue logic models-Case A.

As can be seen in Figure 37 and Appendix 5, the model-V provides the best value for the customer in the long run, which is a partial deferment of CAPEX value to yearly instalment based payments (linked to certain Key Performance Indicators (KPI) in the operation phase, which are directly impacted by plant design) but with inclusion of extended services scope for plant operation phase in the CAPEX contract.

6.2.2 Secondary Case

The customer case-B was selected to be the secondary case. The customer in this case is a start-up mining company in the Americas with no existing mining operations. The project is to develop a greenfield ore deposit of precious metals, located in an extremely remote, climatically challenging and ecologically sensitive location in the Americas. This greenfield project involves development of mines and then extraction of the target minerals through an integrated minerals processing and metallurgical plant. The capacity of the proposed operation is relatively small when compared to the scale of mining operations in precious metals mining. The project is currently in the stage of detailed feasibility study and initial stage of permitting and licensing. The case firm has been involved with the customer in the development and feasibility stages of the project by assisting with product and services offerings. The case firm is keen to support customer in the project execution and operation stages of the integrated plant.

First, the resonating focus in CVP for the customer was determined from the CVP structure template through Email communications (Data ID: 3D-e1), using the methodology described in Section 5. The summary of the findings is presented in Table 24 below. The detailed results are provided in Appendix 6.

Table 24. Resonating focus for customer case –B (internal view).

TARGET TOP CUSTOMER NEEDS	SOLUTION ELEMENTS FOR PROBLEM-SOLUTION FIT		
	POINTS OF DIFFERENCE	POINTS OF PARITY	POINTS OF CONTENTION
Guaranteed performance	R&D Services	Guaranteed start-up curve	Training Services
Skill shortage	Performance Guarantees	One stop supplier	Operations Support
Plant operatability in remote sites	Predictive Performance Advisory	Production ramp-up support	
	Troubleshooting Advisory	Modular plant +/- capacity	
	Advanced automation products and services		
	Digital plant support		

As can be seen in Table 24, the key customer needs are related to operation in remote area and guaranteed plant performance, crucial for any integrated precious metal production plant. The case firm is suitably positioned with existing competitive edge in technology R&D and emerging core competence of digital plant.

Following Figure 38 presents the value-in-use generated through alternative revenue logic models for customer case-B. The key input view for the model is provided in Appendix 7. However, for confidentiality between the case firm and the customer, all the

inputs were rebased to the CAPEX outlay requirement of 100 million Euros. Thus all the necessary input parameters were proportionately and logically changed to the plant capacity and requirement, needing CAPEX investment of 100 million Euros by the customer.

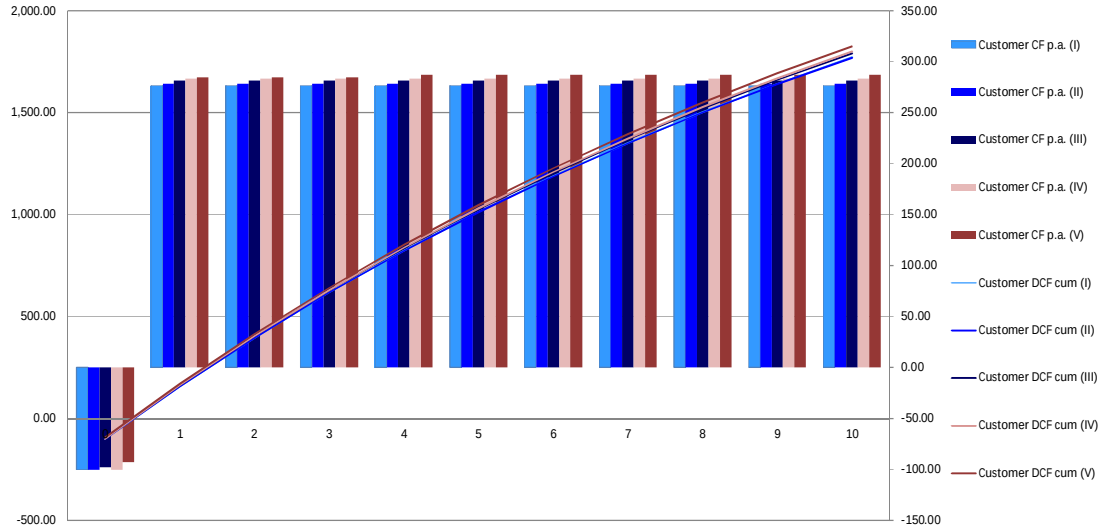

Figure 38. Customer value in different revenue logic models-Case B.

As can be seen in Figure 38 and Appendix 7, the model-V provides the best value for the customer in the long run, which is a partial deferment of CAPEX value to yearly instalment based payments (linked to certain Key Performance Indicators (KPI) in the operation phase, which are directly impacted by plant design) but with the inclusion of extended services scope for the plant operation phase in the CAPEX contract. However, model-IV is also quite close to model-V during the initial years of plant operation.

Consequently, testing and validation of new CVP with two customer cases provided the necessary confidence in the developed template for the CVP structure and customer value calculator tool. The comparative risk analysis of different revenue logic models is presented in the following sub-section.

6.3 Comparative Risk Analysis

The evaluation of the impact of the new CVP and associated revenue logic on the other components of the existing business model in the case firm is excluded from the study scope. However, it is imperative to review the risks associated with the delivery of the new CVP through the alternate revenue logic models, developed in the proposal building

stage. It is of course true that the rewards are proportionate to the amount of risks involved, but it is irrational to develop a revenue earning model with associated risks much higher than the existing consumption capacity of the case firm.

Therefore, the risks were analysed for all the five alternate revenue earning logics, including two existing models (I and II) and the new alternatives (III, IV and V), already described in detail in Section 5. Ten parameters were chosen for risks associated with delivering the minerals processing plant projects to the target customer segment of 'junior & start-up': technological risks appearing from new technologies or new applications; availability of resources and competences to deliver the CVP on a longer time-frame; socio-political risk associated with the country or region of the project site; variability in plant performance; financial risk of uncertainties, long exposure, dependence on too many variables and so forth; HSE (Health, Safety and Environment) issues; faulty operation and/or maintenance of the plant by the customer team; third party influence (other suppliers and contractors in both execution and operational phases, regulatory agencies, local population etc.); liquidated damages for delay in project execution and penalties for poor plant performance; and Force Majure events. Following Figure 39 represents the outcome of risk analysis of all five alternate revenue logic models.

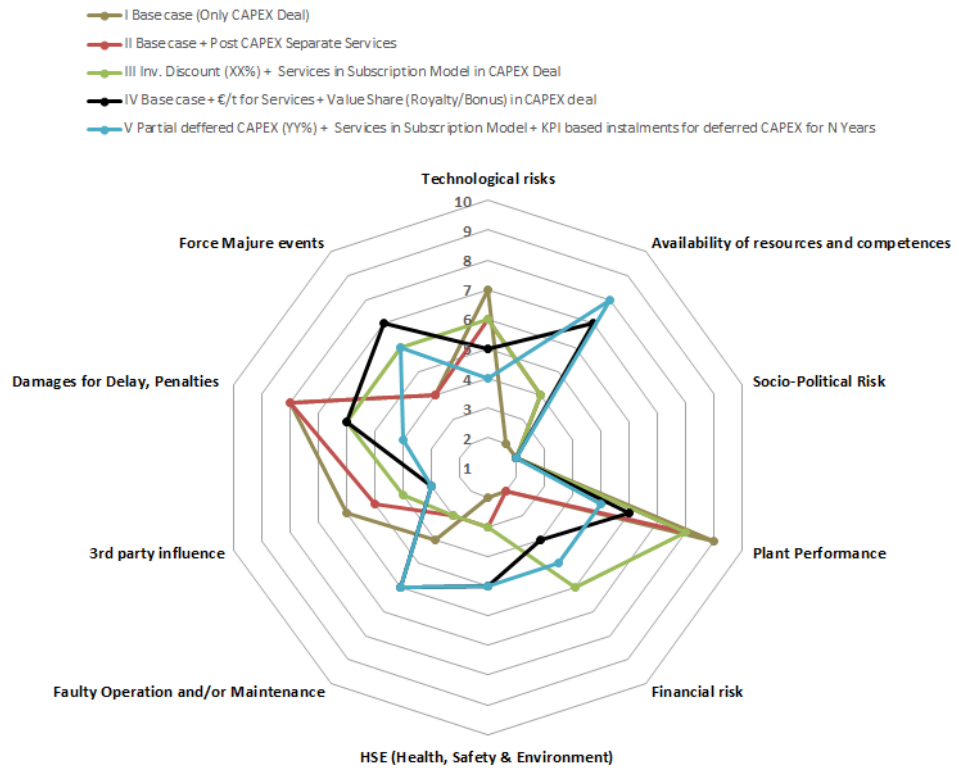

Figure 39. Risk analysis for delivering new CVP through alternate revenue logics.

Figure 39 shows that model-V has the highest risks in three risk factors, but to balance that out, only low to moderate level risks in seven factors. Model-IV similarly has highest risks in three factors and second highest risk in one other factor. Model-III has the highest risk in only one area, but has second highest risk in another five factors, thus making it the riskiest business proposition for the case firm.

6.4 Evaluation and Feedback for Improvements in CVP

The evaluation and feedback collection for the new CVP design approach and the new CVP, were done in two parallel steps. First, the internal stakeholders provided their inputs in the workshop (Data ID: 3D-w2). Second, the customer feedback was obtained during the customer meeting (Data ID: 3D-c1).

The crucial test for any CVP is the reaction from the customers. The customer for test case-A was in agreement with the new CVP design approach of the case firm and provided valuable suggestions for improvement. In customer words:

> *"I am quite surprised to see that the template tool actually works and if used properly, leads to the true priority needs. However, you need to bring one dimension in the tool and that is time aspect. The same project has different needs at different stages of the project lifecycle and they should not be mixed up by looking at the overall view."*
>
> *Data 3: CEO, Customer company of case-A (Data 3: 3D-c1)*

For internal assessment, the relevant seven questions were selected from the *'10 Characteristics of Great Value Propositions'* (Osterwalder et al. 2014). The assessment results and the associated feedback are presented in Figure 40.

CHARACTERISTICS	RATING	KEY COMMENTS RECEIVED
Focuses on few pain relievers and gain creators, but does those extremely well.		-"Standard way to seek CVPs would be extremely good to have as we can check how well it fits to our capabilities and product portfolio. This acts as a check list, when building the win plans, client sales presentations etc." - "These are the factors, which make difference! Only challenge is that they need to be correct ones." - "Gives a new and structured angle to think about these issues. But it is to be seen if this is difficult to use?"
Focuses on jobs, pains, or gains that a large number of customers have or for which a small number is willing to pay a lot of money.		-"The segment chosen has a considerable amount of customer projects where the value proposition is valid. However, the value proposition needs to be validated with some real cases." -"Most of the mega trends (and smaller ones) have been considered in the work. The rest depends much on client's execution model, permits, financing, etc."
Aligns with how customers measure success.		-"Viability of project is measured with NPV/IRR and other economic KPI's, and the value proposition contributes in finding an innovative way of making the project viable." -"If we are able to lower capex investment/ remove capex to opex, and client is able to get operation up and running, this model is success"
Focuses on the most significant jobs, most severe pains, and most relevant gains.		-"Focus is there, however more clarity is needed for defining the actual content of elements."
Differentiates from competition in a meaningful way.		-"Only yes if we have all the components ready to deliver for the client and those need to be proven."
Outperforms competition substantially on at least one dimension.		-"This way we can find better our "spread heads" in specific cases. It's case specific / client needs will dictate which CVP matters"
Is difficult to copy.		-"Depends on what customer values most." - "Concept can be copied, but experience not." - "€/t model is already in place in market from certain competitors" - "How to motivate the use of this tool/approach?"

Meets or exceeds the requirement Cannot say/ Neutral Does not meet the requirement

Figure 40 Internal assessment and feedback on new CVP design approach

Figure 40 provides evidence that the new CVP for the target customer segment is successful in having five key characteristics out of seven, for being a great CVP model. It is neutral in one dimension (differentiating from the competition) and unsuccessful in one dimension (threat of being copied by competition). The feedback collected from customer, internal stakeholder and risk analysis results (sub-section 6.3) necessitates some improvements in the new CVP. The identified improvement area and proposed actions are presented in Table 25 below.

Table 25. Key improvement area and action plan for new CVP.

S.No.	KEY IMPROVEMENT AREA	ACTION PLAN
1	The time aspect of the project stage requires to be included in the process of CVP design	To be partially included in the final CVP structure template
2	The CVP template to find focus value needs to be simplified and user friendly	To be covered in final CVP by converting the template to partially automated tool
3	The visible instructions for using the template are needed	To be included in final CVP form
4	Motivation for users in the case firm to utilize the template	This is a leadership and management issue, to be dealt separately by the case firm

S.No.	KEY IMPROVEMENT AREA	ACTION PLAN
5	More testing is needed with real cases	To be done in post-thesis stage because of time constraint
6	Availability of key people, processes and partners to deliver the new CVP in alternate revenue logic models	This requires thorough investigation of existing business model of the case firm in the light of new CVP and RLs, which is necessary but excluded from the thesis scope
7	The concept of €/t based revenue model already exists in the market (Model-V)	No action required as the concept is already different by integrating the model into the early phase of CAPEX solutions.
8	The revenue logic model-III for providing CAPEX investment discount, so to include more service components in the CAPEX phase has the relatively highest risk amongst the alternatives.	To be excluded from the final CVP

Based on the above feedback, the CVP structure to find focus value was updated. The final CVP is discussed in the next sub-section.

6.5 Summary of the Final CVP

According to the action plan described in Table 25 in the previous sub-section, the template for CVP structure to find focus value was modified into a semi-automated tool and also the time-aspect of the project stage was included as an input criteria. Brief instructions were included in the template for the benefit of the user. The visualization of the finalized structure tool in Figure 41 and revised customer value calculator model in Figure 42. The revised customer value calculator tool now excludes the revenue model-III on the account of overall higher risk exposure for the case firm.

PROJECT NAME:

PROJECT STAGE: Development/Feasibility/Permitting/ Financing/Execution/Operational

SALES STAGE: P1/P2/P3/P4

STEP-1

Expected Gains

Pain Points

Jobs to do

To be filled in after sales meeting with Customer

Need Element	Fit with MVP Solution Element	Project Need Scale: 1(Lowest)-5 (Highest)
Permits	1, 13, 16, 17, 18	
License to Operate	1, 13,16, 17	
Guaranteed performance	1,2,3,6,9,10,11,12, 14, 18,20	
Viability of the Project	1,3,7,8,11	
Opportunity to sell the Project	1,2,3,7,18,20	
No cash in-flow from the start	2, 11	
Low entry cost	7,8,15	
Skill shortage	6,9,10,11,12,14,19	
Adaptability to market demands	1,6,7,12,14,15, 19	
Financing	2,3,5,8	
Ore variability, effective blending	1,6,12,14,19,20	
Complex design, poor ramp-up	1,2,3,4,6,11,12,14, 19, 20	
Plant operatability in remote sites	2,3,4,6,9,10,12, 14, 19	
No precise valuation for deposit & investment	1,7,16	
Digitalization to production forecasting & cost control	1,6,7,14, 19	
Better NPV/IRR	2,3,6,11,14	
Delay in project	2,5,11,15	
Phased and modular approach	1,15	
Faster project schedule	2, 4,5, 11	

Instructions:
1. Find the solution elements appearing most in the identified top needs with need ranking ≥ 4.

2. Find the competitive edge from CVP elements--find points of difference, points of parity, points of contention

STEP-2

Points of Difference
Points of Parity
Points of Contention

**** Strong
*** Medium
** Low
* Emerging
n/a Non-existing

Finding focus from solution elements

S.No.	MVP Solution Element	Occurence in high ranked needs	Case Company Competence	Exists in Market	Position of competitor X & Y: Competitor Competence
1	R&D Services	0	****	Y	**
2	Guaranteed start-up curve	0	**	Y	**
3	Performance Guarantees	0	****	Y	***
4	One stop supplier	0	****	Y	****
5	Delivery time guarantee	0	****	Y	****
6	Predictive Performance Advisory	0	**	N	*
7	CAPEX-OPEX estimation	0	***	Y	***
8	Capability to arrange financing support	0	***	Y	***
9	Training Services	0	***	Y	****
10	Troubleshooting Advisory	0	****	Y	***
11	Production ramp-up support	0	***	Y	***
12	Operations Support	0	**	Y	***
13	Technology support in permitting	0	*	Y	n/a
14	Advanced automation products & services	0	****	Y	***
15	Modular plant +/- capacity	0	*	N	*
16	Water management technologies	0	***	Y	***
17	Green waste technologies	0	***	Y	**
18	Proven proprietary process equipment	0	****	Y	****
19	Digital plant support	0	***	N	**
20	Geo-Met consultation services	0	***	N	*

Instructions:
1. Find the top 3-4 needs being met by points of difference

2. Build CVP highlighting the points of difference, but also including points of parity

3. CVP demonstration should include the fit between the top needs and points of difference.

STEP-3

Expected Gains

Pain Points

Jobs to do

Finalizing Target Needs

Need Element	MVP Solution Element	Project Need Scale: 1(Lowest)-5 (Highest)
Permits	1, 13, 16, 17, 18	0
License to Operate	1, 13,16, 17	0
Guaranteed performance	1,2,3,6,9,10,11,12, 14, 18,20	0
Viability of the Project	1,3,7,8,11	0
Opportunity to sell the Project	1,2,3,7,18,20	0
No cash in-flow from the start	2, 11	0
Low entry cost	7,8,15	0
Skill shortage	6,9,10,11,12,14,19	0
Adaptability to market demands	1,6,7,12,14,15, 19	0
Financing	2,3,5,8	0
Ore variability, effective blending	1,6,12,14,19,20	0
Complex design, poor ramp-up	1,2,3,4,6,11,12,14, 19, 20	0
Plant operatability in remote sites	2,3,4,6,9,10,12, 14, 19	0
No precise valuation for deposit & investment	1,7,16	0
Digitalization to production forecasting & cost control	1,6,7,14, 19	0
Better NPV/IRR	2,3,6,11,14	0
Delay in project	2,5,11,15	0
Phased and modular approach	1,15	0
Faster project schedule	2, 4,5, 11	0

Figure 41. Final CVP structure to find resonating focus.

Metropolia

V. Input -YY % V. Input -N	Project			
	Capex (m€)	Sales revenue (m€ p.a.)	Process-ing cost (m€ p.a.)	Other expenses (m€ p.a.)

Customer	WACC	Capex (m€)	Opex: Materials (m€ p.a.)	Opex: Support (m€ p.a.)	Sales revenue Δ (%)	Processing cost Δ (%)	Case Firm's share of customer value (%)	NPV 10 yrs (m€)
I Base case (Only CAPEX Deal)								0.00
II Base case + Post CAPEX Separate Services								0.00
IV Base case + €/t for Services + Value Share (Royalty/Bonus) in CAPEX deal								0.00
V Partial deffered CAPEX (YY%) + Services in Subscription Model + KPI based instalments for deferred CAPEX for N Years								0.00

Figure 42. Revised customer value calculator model.

Thus in summary, this section concludes the work done in the study through testing, validation, assessment, collection of feedback and finally improvements in the new CVP for minerals processing plants project business of the case firm, addressing the needs of junior & start-up customer segment. The CVP design approach is found to be efficient in identifying the priority needs of the target customer segment, creating appropriate problem-solution fit with the value elements in the case firm's portfolio and further discovery of points of differentiation through finding project and customer specific competitive edge. The new CVP design approach is validated through assessment by customer, thus confirming the customer interest and preparing the ground for the next stage of business model review in light of the new CVP, before the final stage of 'to the market'.

7 Discussion and Conclusions

This section summarizes and concludes the thesis. The section also contains recommendations for taking the new CVP design approach forward to implementation and other derivative actions endorsed by the author, which were found as corollary of the thesis work and are relevant to the case firm. Finally, the section concludes with the evaluation of the thesis in terms of relevance, logic, validity and reliability.

7.1 Executive Summary

The case firm is a well-established technology and projects company in B2B industry, serving mainly the mining and metal production companies. One of the key offerings of the case company is the solution for minerals processing plant projects, required by the mining companies. The business challenge for the case company stems from three dimensions: hyper-competitive market behaviour due to uncertainty and increased cyclicity in the global economy and especially commodity market; sustainability issues forcing the customers to demand new solutions; and new technology disruptions which are invasive and impacting the B2B industry, such as digitalization. Also the goods logic still dominates the case firm and thus creates a disconnection between the plant and services offerings.

The goal of the thesis was to develop a new customer value proposition (CVP) design approach along with new alternatives for basic revenue logic, which is more customer focussed and service logic oriented. As the first step for customer focus, only one of the customer segments, ‘Junior & Start-up’ was chosen as the premise of the study. The intended outcomes of the thesis were a new CVP for the target customer segment by incorporating the service logic centric approach, a customer value calculator tool to demonstrate financial value of the new CVP through alternate revenue logics and finally a holistic customer centric CVP design approach, which could be utilized in essence for other customer segments.

The qualitative research method with an applied research approach was embraced in the study, even though some elements of action research and few mathematical-financial tools were used as well. After setting up the business challenge, objective and outcome, the research design of the thesis consisted of four sequential stages. The stages were: literature research to find foundational concepts and tools for customer centric and service oriented CVP design; current state analysis of existing CVP of the case firm;

development of the new CVP and revenue logics; and lastly the testing and assessment of the new CVP for validation and improvement.

The first stage was the search for existing knowledge on customer value, service logic in B2B industry, customer centric CVP innovation, revenue logic development and methods as well as tools for great CVP design. The result of this stage was a conceptual framework with service logic in core, elements of CVP and the concept of creating resonating focus. The CVP design platform and tools were also identified in this stage, such as value proposition canvas, strategy canvas and customer needing classification. The framework concluded with a six-step process for creating and testing the CVP and revenue logic.

The second stage was the current state analysis of the existing CVP of the case firm for the target customer segment, utilizing the conceptual framework. The work included review and analysis of the existing internal documents and data of the case firm, industry reports, public documentation on six customer and two peer companies as competitors, and finally research interviews with fourteen internal stakeholders and four customers. The first action in the analysis was to identify the market drivers, which consist of increasing difficulty in ore resources; sustainability issues; growing uncertainty and cyclicity in commodity market as the market pull and digitalization; requirement of new raw materials for electric vehicles; and technologies to use minimum water and energy as the technology push. The second action was to find the core competences of the case firm. The third action identified the key customer jobs, pains and gains for minerals processing plants, in both project development and operational phases. The fourth action was to find the problem-solution fit between the existing CVP and the identified customer need profile, followed by an analysis of the existing revenue logic. The fifth action was to find the competitive positioning of the case firm's CVP against the CVP of the two competitors. Finally the stage concluded with the summary of strengths and weaknesses of the case firm's existing CVP. The existing strengths were identified as technology R&D capability, quality and wide range of offerings, advanced automation solutions and market credibility through past performances. The weaknesses, which were selected for perusal in the CVP development stage are flexibility issues, perception of being expensive, lacking customer specific focus in solution design and gap between CAPEX and services sales.

The third stage was the development of the new CVP structure and associated revenue logic for the target customer segment in internal workshops, using the conceptual framework and current state analysis results as inputs. The new CVP design approach first

identifies the needs of target customer segment through the lens of service logic and the CVP elements which fit with these need elements. Three prototypes were created to develop the minimum viable product (MVP) and associated three revenue logic alternatives to deliver the MVP and include more services components in the offering. The three alternatives were: 1) discount in CAPEX offering to include extended operational service support components as part of the CAPEX deal; 2) inclusion of operational services offerings in the CAPEX solution with cost/tonne model for services and sharing of value-in-use generated for customers; and 3) partial deferral of CAPEX value into operational stage as yearly KPI based instalments, along with inclusion of extended operational service support components as part of the CAPEX deal. Micro-analysis for each customer need element was done to fit with the relevant solution elements in the MVP. Thereafter, competitive edge of each solution element was analysed against the capability of competitors, followed by mapping of the new CVP against the existing CVP and competitor CVPs on the strategy canvas. The key competitive factors for the new CVP were found as R&D capabilities for technology, improved position in green waste and water management technologies, flexible and service oriented revenue logics. Then, the findings from the above actions were utilized to create the CVP structure template to find focus value for customers in individual projects and the associated points of difference, parity and contention in the case firm's CVP. Finally, the customer value calculator was developed to demonstrate financial value for customers in each revenue logic model to deliver the focus CVP found from the CVP structure. Five models were compared in the tool: two existing revenue models and three alternative models created during the MVP development. Thus the new service centric CVP was developed for the case firm for minerals processing plants project business in the context of Junior & Start-up segment.

The fourth and final stage of the thesis focussed on testing and assessment of the new CVP for validation and improvement. The objective was achieved through internal workshops, meetings and customer meetings. Two live customer cases from the junior & start-up segment were tested with the new CVP for validation. Generally, the new CVP design approach and developed tools were appreciated for their usefulness, ability to create customer focus, ability to identify the true customer needs and competitive value elements satisfying them. Constructive suggestions were received to include more user friendly features and requirement of more testing with real cases. The suggestions were partially included in the final CVP design, as presented in Figure 41 and 42 previously.

Thus, the final CVP design is the concluding outcome of this thesis. The final CVP has three key deliverable components: 1) the new CVP structure tool to find resonating focus in minerals processing plants project business offerings of the case firm for the Junior &

Start-up customer segment; 2) customer value calculator tool to demonstrate financial impact of value-in-use generated in alternate revenue models; and 3) overall new CVP design approach which is customer centric and service logic oriented.

In the next sub-section, the practical implications of the thesis outcome for the case firm are presented and future course of actions is recommended.

7.2 Managerial Implications

The objective of the study was to improve the existing CVP of the case firm for minerals processing plants project business in a more customer centric way and integrate service logic in the process. The study outcome meets the above objective and thereby also includes more operational services offerings as part of the CVP with two new innovative alternate revenue logics to capture greater share of value-in-use. The managerial implications of the outcome of the thesis are twofold: the future course of actions to implement the new CVP and the implications for other aspects of business in the case firm.

The first set of recommendations as given below are for taking the new CVP forward and implementing for the target customer segment of Junior & Start-up. Based on the findings of this thesis, it is recommended:

- To conduct more customer interviews in the target customer segment to conclusively cement the findings in the thesis;
- To conduct internal review and workshops to assess the implications of the new CVP on the other components of the existing business model and evaluate the changes required from the implementation point of view;
- To implement the new CVP and revenue models in the market with actual sales cases;
- To fully automate the new CVP structure tool from present semi-automated version;
- To train the sales team both at Business Unit and Market Area level on the new CVP design approach and tools;
- To develop similar CVP structure and revenue logic models for other two customer segments in minerals processing plants project business of the case firm, majors and the mid-tiers.

- To expand on the impact of time aspect on the customer needs in project lifecycle, the CVP structure needs to be evolved further into a “dynamic CVP” that takes the changing needs over the entire project lifecycle into account.

The second set of recommendations, as given below, includes observations noted either by the researcher or the co-creators during the study and are applicable in general:

- The new CVP design approach is robust in concept and therefore can be applied to other solution offerings of other business units of the case firm;
- The gap between the CAPEX sales and operational Services sales need to be removed for improving the competitiveness and increasing the non-cyclical business for the case firm. The CAPEX sales team needs to include services sales representative from the early phase of customer discussions;
- The emerging competences of digital plant and geo-metallurgical services need to be established rapidly as the demand for these services are increasing fast and they significantly meet the market pull drivers.

In the next sub-section, the thesis research and analysis work are evaluated for relevance, logic, validity and reliability.

7.3 Thesis Evaluation

It was described in sub-section 2.1 that the research method adopted for this study is qualitative research through applied research approach, utilizing some elements of action research and few mathematical tools. In sub-sections 2.2 and 2.3, the research design plan and data collection and analysis plan have been described respectively. This discussion focuses on the evaluation of the research quality in the study.

The basic research in business and management is required to be rigorous research, which is valid, reliable and meets the standards of scientific research and can hold ground in peer review (Myers 2013: 12). The applied research can be defined as relevant research of immediate relevance in business applications and without much theoretical contribution (Myers 2013: 12). Projects conducted by consulting houses are predominantly of this research type (Tushman and O’Reilly III 2007). Qualitative research family in business and management, which study practical situations with real people in real organizations, is the field where the need for rigour and relevance both are present (Myers 2013: 12). Therefore, the evaluation of this thesis consists of elements from both relevance (relevance and logic) and rigour (validity and reliability).

7.3.1 Validity

Validity in research is defined by the analysis of deviation in response against the context of the original question. It is also measured as the deviation of the research outcome from the original objective. The most used types of validity tests are internal validity, external validity, construct validity and reliability (Quinton and Smallbone 2006).

Internal validity is to test the convergence of the data collected and analyzed with the objective of the data collection and analysis, which is defined in research design stage (Quinton and Smallbone 2006). In this study, clearly defining the business challenge and objective in line with the case company strategy and then reviewing the same with all internal stakeholders in the current state analysis stage ensured internal validity. Then the questions in the research interviews, development and validation processes in the workshops were chosen to reflect the aspects of the business challenge and the end goal. The interviews were structured and the majority of the questions were common to all the stakeholders so that sufficient viewpoints were available to draw inferences. The interviews were recorded and subsequently field notes were made as transcripts of the audio recordings. This was followed by running a crosscheck with the interviewees for the authenticity. The findings from each research stage was reviewed by the “Key Stakeholder Team” for progressive evaluation. Lastly, the researcher, having 14 years of experience in both the customer and provider spheres in this industry, had sufficient expertise required for research in this domain.

External validity is an assessment of the research outcome as a probable application in other business contexts or situations. It is also a measure of the extent of this possibility (Quinton and Smallbone 2006). This thesis dealt with a specific business context for a specific offering from the case firm for a target customer segment. Potential for applications outside the boundary of target customer segment was not considered in the development of the CVP structure tool and customer value calculator, henceforth they are not applicable as such for other customer segments or technology solutions. However, one of the outcomes of the thesis, which is the CVP design approach and method, can be very well applied to the other customer segments of the case firm in minerals processing plants project business and also for different plant technology solution offerings from other Business Units. Also the business challenge addresses a common larger need in the customer sphere of the associated industry and thus the proposed solution could be applicable for the peers as well. Nevertheless, the results of this research have not been tested and validated in these contexts and henceforth, cannot be proven.

Construct validity is the assessment of the research outcome, which impacts the inherent validity of the theoretical framework guiding the research in the first place (Quinton and Smallbone 2006). In this study, the literature research was done to address the key elements of the business challenge and objective. The selected material were chosen from the high impact peer reviewed sources and also from the articles by reputed industry practitioners or consulting houses in the context of specific operating environment of case firm. The theoretical framework developed in this stage was partially used in the current state analysis to capture the sample view and then also was used for developing and validating the solution. Several internal key stakeholders reviewed the final research results, confirming the validity of the research process and outcome.

7.3.2 Reliability

Reliability in research is defined by the consistency and robustness of the results, which can be measured by repeating the research by the same or different researcher. For qualitative research in business management, the same is usually improved by use of different data sources and several data collection tools. This practice enables to create various answers through different means to answer the same question and measure the difference in the answers. This method is known as triangulation. Convergence of the answers increases reliability of research (Quinton and Smallbone 2006). For triangulation, different types of data e.g. primary data and secondary data can be used and sometimes, different research methods are used as well e.g. both qualitative and quantitative research methods (Myers 2013: 12).

In this study, reliability of the research was ensured by data triangulation with inputs from different data sources collected and analyzed via different methods and tools. This was done for all the critical elements identified in the theoretical framework. During the current state analysis stage, primary data for participant views was collected through interviews and workshops with internal stakeholders. Non-participant views were collected through customer interviews. Secondary data was collected through existing internal data and documents, industry reports customer documentation and competitor documentation available in public domain. The analyses of the same were compared with each other for each topic to achieve data triangulation. Critical differences in results were also noted and reviewed in key stakeholder meetings. The templates for the interviews are provided in the Appendices. The existing data, documents, interview recordings, transcripts are well preserved and available for internal consumption in the case company. Thus, any researcher, having access to these data and tools can repeat the same research.

During the CVP development stage, the co-creation method was adopted and several internal stakeholders were engaged in developing the proposal in workshops. During the testing and validation stage, the same method was followed and in addition, customer feedback was obtained. The customer feedback, supporting the outcome of the research, provides evidence of reliability of the thesis results.

In various stages of the research work, the researcher engaged more than twenty internal stakeholders who are performing diverse functions in the case firm and are directly associated with the business challenge. In addition, the results of each thesis stage were reviewed by a key stakeholder team, representing management presence and ensuring robustness of the work. Seven internal stakeholders participated in every stage of the thesis work, thus maintaining the consistency aspect.

Finally, the potential bias needs to be evaluated in the selection of academic literature for literature review and selection of data informants and questionnaire (Quinton and Smallbone 2006). A large amount of bias in any stage corrupts the research project. In this context, the researcher stated his role in the case firm in sub-section 1.3, for maintaining transparency. Since the researcher was deeply involved in day-to-day operation in the field related to the business challenge, therefore bias could not be completely eliminated. Still, the researcher made conscious and consistent efforts to maintain a neutral position during all data collection, analysis and usage points. The researcher enforced the co-creation method for analyzing data, developing and testing the solution with other stakeholders during the workshops and maintained the role of facilitator. Further, to ensure minimum bias, the outcomes of all stages were reviewed by the key stakeholder team.

7.3.3 Relevance

Relevance of business research is the connection of research to address a specific business challenge. In all the phases of current state analysis, construction of conceptual framework, creating the solution and testing of the solution, the relevance to the original business context need to be checked. Finally, researcher view on generalization of the research outcome i.e. whether the research is relevant in other business contexts (other functions/business area of case firm/business environment, general industry/sector in which the research is set, other industries/business environment or entire spectrum of populations), needs to be evaluated (Quinton and Smallbone 2006).

In the study, first the business challenge and research objective were set in line with the corporate strategy of the case firm. Furthermore, structured interviews with customers and internal stakeholders from various functions were held to check the relevance of the

business challenge, objective and current state. Relevance of the conceptual framework developed through literature survey and solution development process were checked by internal stakeholders in workshops. The test results of the developed solution were reviewed by both customer and key stakeholders to confirm the new CVP and the CVP design approach are relevant.

7.3.4 Logic

Logic in a research and development project reflects the interdependent and coherent connectivity of different steps taken to arrive at the research outcome against the objective set at the beginning. In this study, the research plan (sub-section 2.2) reflects the connectivity of different steps to arrive at the desired end results. The conceptual framework, developed in the literature review step, connects the current state analysis and proposal development stages together through common elements. The proposal validation was built on the continuity of the same approach. Informants, both internal and external, were selected on the criteria of presence in the value chain at various stages.

7.4 Closing Words

The global market drivers are changing the shape of all industries, including mining. Sustainability issues, difficult ore resources, volatility and uncertainty in the commodity market and global economy are creating new needs in mining companies. On the other hand, new invasive technologies like digitalization are providing tools to serve these needs. In this context, the case firm needs to reinvent the CVP for the minerals processing plants project business to remain competitive. This background calls for a more customer centric approach and shift towards service logic. The thesis provides a design approach to successfully achieve the same and further creates the solution for one of the customer segments of the case company. The research outcome of the study, along with the recommendations for future actions, should enable the case firm to serve the customer needs with a service logic based resonating focus and also to increase its own share of value-in-use in the customer sphere.

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APPENDIX 1: Customer Interview Template

Research Interview (Discussion) ---Master's Thesis *"Developing a New Customer Value Proposition (CVP) Design Approach for Minerals Processing Plants Project Business"*

TOPIC: Current State Analysis

Information about the informant (Interview 1)

Table 1

Details			
Name (code) of the informant		**Introductory Presentation---Thesis Premise**	Y
Position in the customer company		**Recording**	Y
Date of the interview		**Confidentiality**	Y
Duration of the interview			
Document	Field notes		

Field notes (Interview 1)

Table 2

	Topic(s) of the interview	**QUESTIONS**	**FIELD NOTES**
	Brief on your role and background		
1	**Market Environment**	How are the sustainability issues (declining resources, difficult resources, scarce utilities and stricter environmental norms) affecting your outlook for concentrator plants?	

	Topic(s) of the interview	QUESTIONS	FIELD NOTES
		How are the current technology disruptions affecting mining industry? Which are the visible technology disruptions in other B2B and B2C industries, which you think may be applied in concentrator plant design and operations?	
2	**Jobs to be done**	What are the key jobs in your mind from both design and operation points, when you are looking for a new concentrator plant solution?	•
		What are the major pains ---undesired outcome/problems/characteristics; obstacles and risks?	•
		What are the expected gains—required, expected and desired?	•
		What is your aspired goal in a concentrator plant?	
3	**Existing Customer Value Proposition (CVP)**	How do you see our existing CVP for concentrator plant solutions and subsequent service offerings?	
4	**To add**	What would you like to add that we have not yet discussed?	

APPENDIX 2: Internal Stakeholder Interview Template

Research Interview (Discussion) ---Master's Thesis *"Developing a New Customer Value Proposition (CVP) Design Approach for Minerals Processing Plants Project Business"*

TOPIC: <u>Current State Analysis</u>

Information about the informant (Interview 1)

Table 1

Details			
Name (code) of the informant		**Introductory Presentation---Thesis Premise**	Y
Position in the customer company		**Recording**	Y
Date of the interview		**Confidentiality**	Y
Duration of the interview			
Document	Field notes		

Field notes (Interview 1)

Table 2

	Topic(s) of the interview	QUESTIONS	CATEGORY	FIELD NOTES
	Brief on your role and background		All	
1	**Market Analysis**	What are the megatrends that are changing the market behaviour?	All	
		How are the current technology disruptions affecting mining industry? Which are the visible technology disruptions	All	

	Topic(s) of the interview	QUESTIONS	CATEGORY	FIELD NOTES
		in other B2B and B2C industries, which may impact our business in near or mid-term future?		
		Cyclical nature of commodity segment---- has it impacted us in recent past? If yes, how to protect against it?	All	
2	**Customer Need/Value**	What is the real need of customer in plant solutions –value potential or value-in-use?	All	
		Have the customers changed their way of purchasing? Who are buying today?	All	
3	**Existing Customer Value Proposition (CVP) and Earning Logic (EL)**	How are we selling the concentrator plant solutions today? Is the present way of selling after-CAPEX-sales services successful enough?	All	
		Have our success factors changed in recent times and if yes, why?	Sales, Delivery	
		Are we still in Goods logic mode or have successfully transformed to Service logic mode?	Sales, Delivery	
		In past 3-5 years, what were the trends in— a. Win rates, sales margins, deal sizes? b. How much service component were added in the CAPEX phases and in after-sales phase? What was the real potential?	Sales, Finance	

	Topic(s) of the interview	QUESTIONS	CATEGORY	FIELD NOTES
4	**Competitor CVP and EL**	How are our competitors selling today? Have they been changing their CVP and RL?	Sales	
5	**Business Risk Assessment**	What are our business risks in present CVP and RL model? Have we been successful to execute the planned risk mitigation properly?	All	
		What are the tolerable risk level in RL, while considering changes linked to changes in CVP?	Sales, Finance	
6	**Development needs**	What are the strengths and weaknesses of our present CVP and RL in concentrator plant solutions?	All	
		Are we equipped to meet the megatrends and technology disruptions? To be the leader or the follower or the spectator?	Sales	
		Which are the most valuable components of CVP for customers, when considering redesign of CVP to be service driven model?	Sales, Delivery	
		What is the target customer segment for testing/implementing the new CVP theory?	All	
7	**To add**	What would you like to add that we have not yet discussed?	All	

APPENDIX 3: Finding Resonating Focus for Test Case-A (Internal View)

STEP-1

Expected Gains

Pain Points

Jobs to do

CUSTOMER NEEDING PROFILE		
Need Element	MVP Solution Element	Project Need Scale: 1(Lowest)-5 (Highest)
Permits	1, 13, 16, 17, 18	2
License to Operate	1, 13,16, 17	2
Guaranteed performance	1,2,3,6,9,10,11,12, 14, 18,20	5
Viability of the Project	1,3,7,8,11	5
Opportunity to sell the Project	1,2,3,7,18,20	3
No cash in-flow from the start	2, 11	4
Low entry cost	7,8,15	3
Skill shortage	6,9,10,11,12,14,19	3
Adaptability to market demands	1,6,7,12,14,15, 19	2
Financing	2,3,5,8	5
Ore variability, effective blending	1,6,12,14,19,20	3
Complex design, poor ramp-up	1,2,3,4,6,11,12,14, 19, 20	5
Plant operatability in remote sites	2,3,4,6,9,10,12, 14, 19	1
No precise valuation for deposit & investment	1,7,16	1
Digitalization to production forecasting & cost control	1,6,7,14, 19	4
Better NPV/IRR	2,3,6,11,14	4
Delay in project	2,5,11,15	5
Phased and modular approach	1,15	3
Faster project schedule	2, 4,5, 11	5

STEP-2

Points of Difference	
Points of Parity	
Points of Contention	

****	Strong
***	Medium
**	Low
*	Emerging
n/a	Non-existing

CVP ELEMENTS						
S.No.	Solution Element	Occurence in high ranked needs	Case Company Competence	Exists in Market	Competitor Position	Position of any other Competitor specific for project??
1	R&D Services	4	****	Y	**	*
2	Guaranteed start-up curve	7	**	Y	**	**
3	Performance Guarantees	5	****	Y	***	**
4	One stop supplier	2	****	Y	****	***
5	Delivery time guarantee	3	****	Y	****	*
6	Predictive Performance Advisory	4	**	N	*	n/a
7	CAPEX-OPEX estimation	2	***	Y	***	***
8	Capability to arrange financing support	2	***	Y	***	*
9	Training Services	1	***	Y	****	*
10	Troubleshooting Advisory	1	****	Y	***	*
11	Production ramp-up support	7	***	Y	***	**
12	Operations Support	2	**	Y	***	*
13	Technology support in permitting	0	*	Y	n/a	
14	Advanced automation products & services	4	****	Y	***	***
15	Modular plant +/- capacity	1	*	N	*	*
16	Water management technologies	0	***	Y	***	
17	Green waste technologies	0	***	Y	**	
18	Proven proprietary process equipment	1	****	Y	****	n/a
19	Digital plant support	2	***	N	**	n/a
20	Geo-Met consultation services	2	***	N	*	n/a

STEP-3

Expected Gains

Pain Points

Jobs to do

Resonating Focus

FINDING FOCUS OF CVP		
Need Element	MVP Solution Element	Project Need Scale: 1(Lowest)-5 (Highest)
Permits	1, 13, 16, 17, 18	2
License to Operate	1, 13,16, 17	2
Guaranteed performance	1,2,3,6,9,10,11,12, 14, 18,20	5
Viability of the Project	1,3,7,8,11	5
Opportunity to sell the Project	1,2,3,7,18,20	3
No cash in-flow from the start	2, 11	4
Low entry cost	7,8,15	3
Skill shortage	6,9,10,11,12,14,19	3
Adaptability to market demands	1,6,7,12,14,15, 19	2
Financing	2,3,5,8	5
Ore variability, effective blending	1,6,12,14,19,20	3
Complex design, poor ramp-up	1,2,3,4,6,11,12,14, 19, 20	5
Plant operatability in remote sites	2,3,4,6,9,10,12, 14, 19	1
No precise valuation for deposit & investment	1,7,16	1
Digitalization to production forecasting & cost control	1,6,7,14, 19	4
Better NPV/IRR	2,3,6,11,14	4
Delay in project	2,5,11,15	5
Phased and modular approach	1,15	3
Faster project schedule	2, 4,5, 11	5

APPENDIX 4: Finding Resonating Focus for Test Case-A (Customer View)

STEP-1

Expected Gains

Pain Points

Jobs to do

CUSTOMER NEEDING PROFILE		
Need Element	MVP Solution Element	Project Need Scale: 1(Lowest)-5 (Highest)
Permits	1, 13, 16, 17, 18	4
License to Operate	1, 13,16, 17	5
Guaranteed performance	1,2,3,6,9,10,11,12, 14, 18,20	3
Viability of the Project	1,3,7,8,11	5
Opportunity to sell the Project	1,2,3,7,18,20	2
No cash in-flow from the start	2, 11	3
Low entry cost	7,8,15	4
Skill shortage	6,9,10,11,12,14,19	2
Adaptability to market demands	1,6,7,12,14,15, 19	2
Financing	2,3,5,8	5
Ore variability, effective blending	1,6,12,14,19,20	3
Complex design, poor ramp-up	1,2,3,4,6,11,12,14, 19, 20	4
Plant operatability in remote sites	2,3,4,6,9,10,12, 14, 19	1
No precise valuation for deposit & investment	1,7,16	2
Digitalization to production forecasting & cost control	1,6,7,14, 19	3
Better NPV/IRR	2,3,6,11,14	4
Delay in project	2,5,11,15	4
Phased and modular approach	1,15	1
Faster project schedule	2, 4,5, 11	2

STEP-2

Points of Difference	
Points of Parity	
Points of Contention	

****	Strong
***	Medium
**	Low
*	Emerging
n/a	Non-existing

CVP ELEMENTS						
S.No.	Solution Element	Occurence in high ranked needs	Case Company Competence	Exists in Market	Competitor Position	Position of any other Competitor specific for project??
1	R&D Services	4	****	Y	**	
2	Guaranteed start-up curve	4	**	Y	**	
3	Performance Guarantees	4	****	Y	***	
4	One stop supplier	1	****	Y	****	
5	Delivery time guarantee	2	****	Y	****	
6	Predictive Performance Advisory	2	**	N	*	
7	CAPEX-OPEX estimation	2	***	Y	***	
8	Capability to arrange financing support	3	***	Y	***	
9	Training Services	0	***	Y	****	
10	Troubleshooting Advisory	0	****	Y	***	
11	Production ramp-up support	4	***	Y	***	
12	Operations Support	1	**	Y	***	
13	Technology support in permitting	2	*	Y	n/a	
14	Advanced automation products & services	2	****	Y	***	
15	Modular plant +/- capacity	2	*	N	*	
16	Water management technologies	2	***	Y	***	
17	Green waste technologies	2	***	Y	**	
18	Proven proprietary process equipment	1	****	Y	****	
19	Digital plant support	1	***	N	**	
20	Geo-Met consultation services	1	***	N	*	

STEP-3

Expected Gains

Pain Points

Jobs to do

Resonating Focus

FINDING FOCUS OF CVP

Need Element	MVP Solution Element	Project Need Scale: 1(Lowest)-5 (Highest)
Permits	1, 13, 16, 17, 18	4
License to Operate	1, 13,16, 17	5
Guaranteed performance	1,2,3,6,9,10,11,12, 14, 18,20	3
Viability of the Project	1,3,7,8,11	5
Opportunity to sell the Project	1,2,3,7,18,20	2
No cash in-flow from the start	2, 11	3
Low entry cost	7,8,15	4
Skill shortage	6,9,10,11,12,14,19	2
Adaptability to market demands	1,6,7,12,14,15, 19	2
Financing	2,3,5,8	5
Ore variability, effective blending	1,6,12,14,19,20	3
Complex design, poor ramp-up	1,2,3,4,6,11,12,14, 19, 20	4
Plant operatability in remote sites	2,3,4,6,9,10,12, 14, 19	1
No precise valuation for deposit & investment	1,7,16	2
Digitalization to production forecasting & cost control	1,6,7,14, 19	3
Better NPV/IRR	2,3,6,11,14	4
Delay in project	2,5,11,15	4
Phased and modular approach	1,15	1
Faster project schedule	2, 4,5, 11	2

APPENDIX 5: Customer Value Calculator Inputs for Test Case-A

III. Input -XX %	5%
V. Input -YY %	15%
V. Input -N	3

Project	Case A		
Capex (m€)	Sales revenue (m€ p.a.)	Process-ing cost (m€ p.a.)	Other expenses (m€ p.a.)
100.00	90.90	15.60	2.00

Customer	WACC	Capex (m€)	Opex: Materials (m€ p.a.)	Opex: Support (m€ p.a.)	Sales revenue Δ (%)	Processing cost Δ (%)	Case Firm's share of customer value (%)	NPV 10 yrs (m€)
	8.00%							
I Base case (Only CAPEX Deal)		100.00	0.00	0.00	-0.8 %	-1.0 %		391.85
II Base case + Post CAPEX Separate Services		100.00	1.40	0.34	0.0 %	0.0 %		389.57
III Inv. Discount (XX%) + Services in Subscription Model in CAPEX Deal		96.50	1.40	0.51	0.8 %	-1.0 %		397.86
IV Base case + €/t for Services + Value Share (Royalty/Bonus) in CAPEX deal		100.00	1.40	0.85	2.8 %	-1.0 %	2.0 %	395.79
V Partial deffered CAPEX (YY%) + Services in Subscription Model + KPI based instalments for deferred CAPEX for N Years		100.00	1.40	1.69	4.0 %	-1.0 %	0.0 %	407.40

APPENDIX 6: Finding Resonating Focus for Test Case-B (Internal View)

STEP-1

Expected Gains

Pain Points

Jobs to do

CUSTOMER NEEDING PROFILE		
Need Element	MVP Solution Element	Project Need Scale: 1(Lowest)-5 (Highest)
Permits	1, 13, 16, 17, 18	1
License to Operate	1, 13,16, 17	1
Guaranteed performance	1,2,3,6,9,10,11,12, 14, 18,20	5
Viability of the Project	1,3,7,8,11	3
Opportunity to sell the Project	1,2,3,7,18,20	2
No cash in-flow from the start	2, 11	1
Low entry cost	7,8,15	4
Skill shortage	6,9,10,11,12,14,19	5
Adaptability to market demands	1,6,7,12,14,15, 19	1
Financing	2,3,5,8	3
Ore variability, effective blending	1,6,12,14,19,20	1
Complex design, poor ramp-up	1,2,3,4,6,11,12,14, 19, 20	1
Plant operatability in remote sites	2,3,4,6,9,10,12, 14, 19	5
No precise valuation for deposit & investment	1,7,16	1
Digitalization to production forecasting & cost control	1,6,7,14, 19	3
Better NPV/IRR	2,3,6,11,14	3
Delay in project	2,5,11,15	2
Phased and modular approach	1,15	5
Faster project schedule	2, 4,5, 11	4

STEP-2

Points of Difference	
Points of Parity	
Points of Contention	

****	Strong
***	Medium
**	Low
*	Emerging
n/a	Non-existing

CVP ELEMENTS						
S.No.	Solution Element	Occurence in high ranked needs	Case Company Competence	Exists in Market	Competitor Position	Position of any other Competitor specific for project??
1	R&D Services	2	****	Y	**	
2	Guaranteed start-up curve	3	**	Y	**	
3	Performance Guarantees	2	****	Y	***	
4	One stop supplier	2	****	Y	****	
5	Delivery time guarantee	1	****	Y	****	
6	Predictive Performance Advisory	3	**	N	*	
7	CAPEX-OPEX estimation	1	***	Y	***	
8	Capability to arrange financing support	1	***	Y	***	
9	Training Services	3	***	Y	****	
10	Troubleshooting Advisory	3	****	Y	***	
11	Production ramp-up support	3	***	Y	***	
12	Operations Support	3	**	Y	***	
13	Technology support in permitting	0	*	Y	n/a	
14	Advanced automation products & services	3	****	Y	***	
15	Modular plant +/- capacity	2	*	N	*	
16	Water management technologies	0	***	Y	***	
17	Green waste technologies	0	***	Y	**	
18	Proven proprietary process equipment	1	****	Y	****	
19	Digital plant support	2	***	N	**	
20	Geo-Met consultation services	1	***	N	*	

STEP-3

Expected Gains	Resonating Focus
Pain Points	
Jobs to do	

FINDING FOCUS OF CVP

Need Element	MVP Solution Element	Project Need Scale: 1(Lowest)-5 (Highest)
Permits	1, 13, 16, 17, 18	1
License to Operate	1, 13,16, 17	1
Guaranteed performance	1,2,3,6,9,10,11,12, 14, 18,20	5
Viability of the Project	1,3,7,8,11	3
Opportunity to sell the Project	1,2,3,7,18,20	2
No cash in-flow from the start	2, 11	1
Low entry cost	7,8,15	4
Skill shortage	6,9,10,11,12,14,19	5
Adaptability to market demands	1,6,7,12,14,15, 19	1
Financing	2,3,5,8	3
Ore variability, effective blending	1,6,12,14,19,20	1
Complex design, poor ramp-up	1,2,3,4,6,11,12,14, 19, 20	1
Plant operatability in remote sites	2,3,4,6,9,10,12, 14, 19	5
No precise valuation for deposit & investment	1,7,16	1
Digitalization to production forecasting & cost control	1,6,7,14, 19	3
Better NPV/IRR	2,3,6,11,14	3
Delay in project	2,5,11,15	2
Phased and modular approach	1,15	5
Faster project schedule	2, 4,5, 11	4

APPENDIX 7: Customer Value Calculator Inputs for Test Case-B

III. Input -XX %	5%
V. Input -YY %	15%
V. Input -N	3

Project Case B

Capex (m€)	Sales revenue (m€ p.a.)	Process-ing cost (m€ p.a.)	Other expenses (m€ p.a.)
100.00	332.80	52.00	2.00

Customer	WACC	Capex (m€)	Opex: Materials (m€ p.a.)	Opex: Support (m€ p.a.)	Sales revenue Δ (%)	Processing cost Δ (%)	Case Firm's share of customer value (%)	NPV 10 yrs (m€)
	8.00%							
I Base case (Only CAPEX Deal)		100.00	0.00	0.00	-0.8 %	-1.0 %		1,770.77
II Base case + Post CAPEX Separate Services		100.00	13.09	0.35	0.0 %	0.0 %		1,768.41
III Inv. Discount (XX%) + Services in Subscription Model in CAPEX Deal		97.50	13.09	0.53	0.8 %	-1.0 %		1,791.08
IV Base case + €/t for Services + Value Share (Royalty/Bonus) in CAPEX deal		100.00	13.09	0.88	2.2 %	-1.0 %	1.0 %	1,799.45
V Partial deffered CAPEX (YY%) + Services in Subscription Model + KPI based instalments for deferred CAPEX for N Years		100.00	13.09	1.76	2.8 %	-1.0 %	0.0 %	1,826.03